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ELECTRIC RAILWAY JOURNAL

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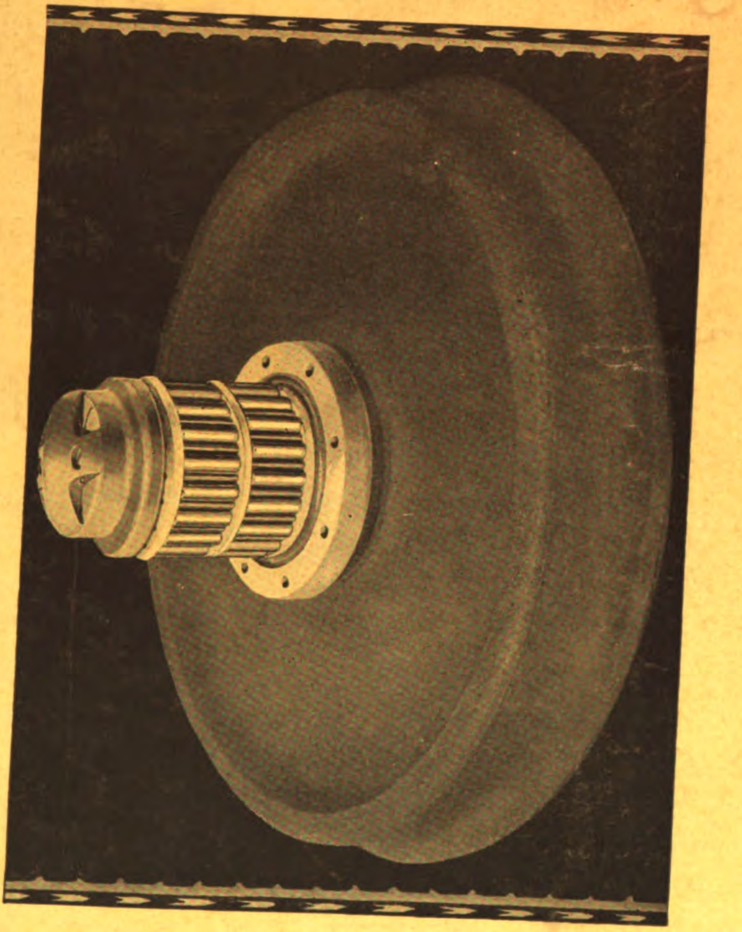

New Hood Thrust Type Stafford Roller Bearing, in which there are 36 fewer parts than in former bearings.

ANOTHER ECONOMY

Without in any way reducing the strength or exceptional friction-reducing properties of Stafford Roller Bearings for car journals, we have simplified and materially reduced the cost of the bearing itself; 36 parts eliminated.

*Write
for the facts
about the
improved bearing.*

**STAFFORD
Roller Bearings**
guaranteed three years

**STAFFORD ROLLER BEARING
CAR TRUCK CORPORATION**
LAWTON MICHIGAN
"IT ROLLS THE FRICTION AWAY"

49
ROLLER SK
AT LINCOLN
EXPER
AUTO
REPAIRS

Track Congestion

The practical remedy for track congestion lies in multiple-unit train operation of low-floor quick-loading cars.

Westinghouse Low-Floor HL Control was designed to meet the requirements of cars operating in such service.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

Sales Offices in All Principal Cities of the United States and Foreign Countries

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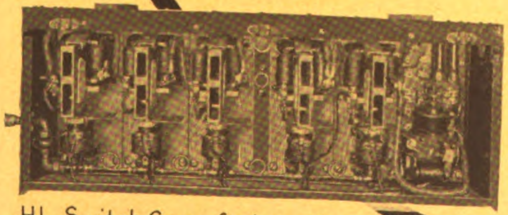

HL Switch Group for Low-Floor Cars

WESTINGHOUSE ELECTRIC

Westinghouse

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TF
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no.18-26
Nov-Dec.
1923

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The costs of electric and steam operation over a period of five years are analyzed on Brazil's important main-line railway. Electrification is expected to save as high as 65 per cent of the total operating cost. Fuel is a major factor.

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Some new thoughts brought out on light-weight cars, standardization of air-brake equipment, automatic substations, track construction, and public relations. Two hundred attend evening dinner at Boston.

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Job Printing

IN a secluded corner of the eleventh floor, a little removed from the din and commotion incident to the working of linotype machines, is the job printing department of the McGraw-Hill Company. Here is a complete print shop within a print shop. These men whom you see cutting leads, and setting type are a busy lot. This is evidenced by the fact that the average weekly output is about 145 jobs. They range all the way from reprints of articles and advertisements for our readers and advertisers to cards, circulars, booklets, company and publication stationery, etc., for our own use. In addition we often fall back on the Job Printing Department to do rush inserts for the publications. Considerable color work, too, is included in its tasks. The handsome literature you see advertising our papers to prospective subscribers and advertisers and promoting our company as a publishing institution is also the product of this shop.

This job printing force is something in your life, too, reader of the ELECTRIC RAILWAY JOURNAL, because "Who's Who" in the railway field is composed right here in this department. Twice a year these men give us the McGraw Electric Railway Directory, without which we railway followers would be lost.

The job composing room pictured above is equipped with the most up-to-date steel type frames, of which there are ten. Seven full series of types are carried. In the press room, there are three Kelly presses, one Universal, and four Chandler & Price presses, two of which are equipped with Miller automatic feeders. Nine men are employed in the pressroom, fourteen in the composing room.

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1923

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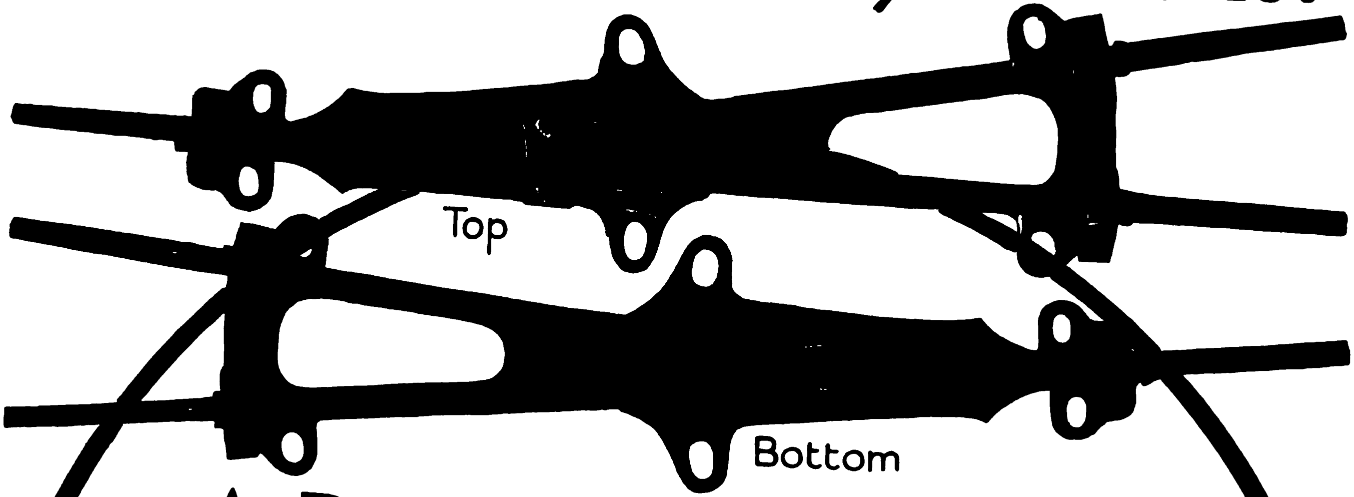
Type CR Universal Trolley Frogs Can Be Used On Any Turnout.



A Decided Advance In Trolley Frog Design

The overlapping-runner design has a much longer life than that of frogs in which the flanges of the trolley wheel travel on the frog pan.

Until the introduction of the Westinghouse Universal Trolley Frog, difficulty was experienced in making the overlapping-runner design operate satisfactorily when running from curve to tangent.

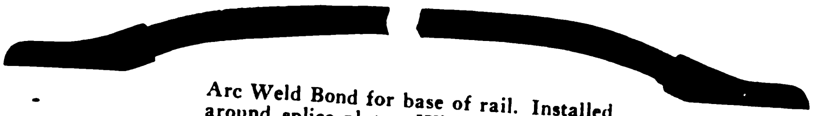
In Westinghouse Universal Frogs the runners are at an angle of 8 degrees when they overlap. At the end of the frog the angle between runners is 12 degrees.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

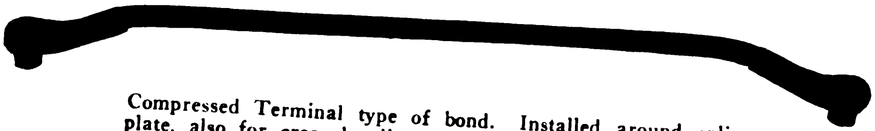
W WESTINGHOUSE ELECTRIC

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA

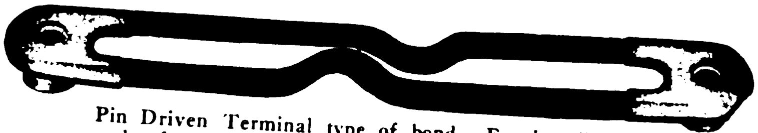
Westinghouse



Arc Weld Bond for base of rail. Installed around splice plate. Wide angle welding scarf makes welding easy. Type AW-7.



Compressed Terminal type of bond. Installed around splice plate, also for cross bonding. Made in a variety of lengths and capacities. Type E-2. Made also in Pin Driven type.



Pin Driven Terminal type of bond. For installing on web of rail under splice plate where space is limited. Made also in Compressed Terminal type. Cut shows special bond for very limited space. Type FP.

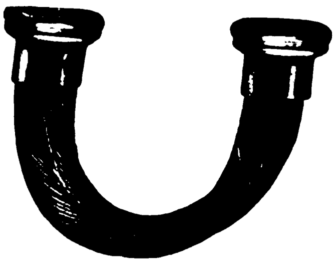
For the Return Circuit

Just part of the list of O-B Bonds that has made the name synonymous with

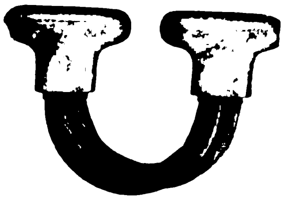
GOOD BONDING

Only the verdict of satisfied users has brought O-B Bonds their

UNIVERSAL RECOGNITION



Gas Weld Bond. A highly efficient gas weld bond for application to ball of rail. Has steel armored terminals. Type ST-2.



Arc Weld Bond for ball of rail. Has a wide angle welding scarf like the AW-7. Type AW-8.

The Ohio Brass Co.
Mansfield, Ohio, U.S.A.

New York Philadelphia Pittsburgh Charleston, W.Va. Chicago Los Angeles San Francisco Paris, France

Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators

Insurance plus
Marsh & McLennan Service

Have You Finished
the Job Right?

Your personnel has been chosen wisely; your plant has been planned carefully; your methods are the last word in efficiency and your products find an insatiate market. Have you finished the job right?

If fire can damage your plant or accidents disorganize your personnel and drive your customers to waiting competitors, you cannot rest secure.

Insurance is the final and fitting step of the wise executive who finishes the job right. He takes care of today and has the vision to protect himself against the emergency that may come at any time. He is prepared against all contingencies by having adequate insurance for his business in all its branches.

As carefully as you choose your banker, just as carefully should you choose your insurance broker. The one assists, the other safeguards your business.

"He who serves best profits most."

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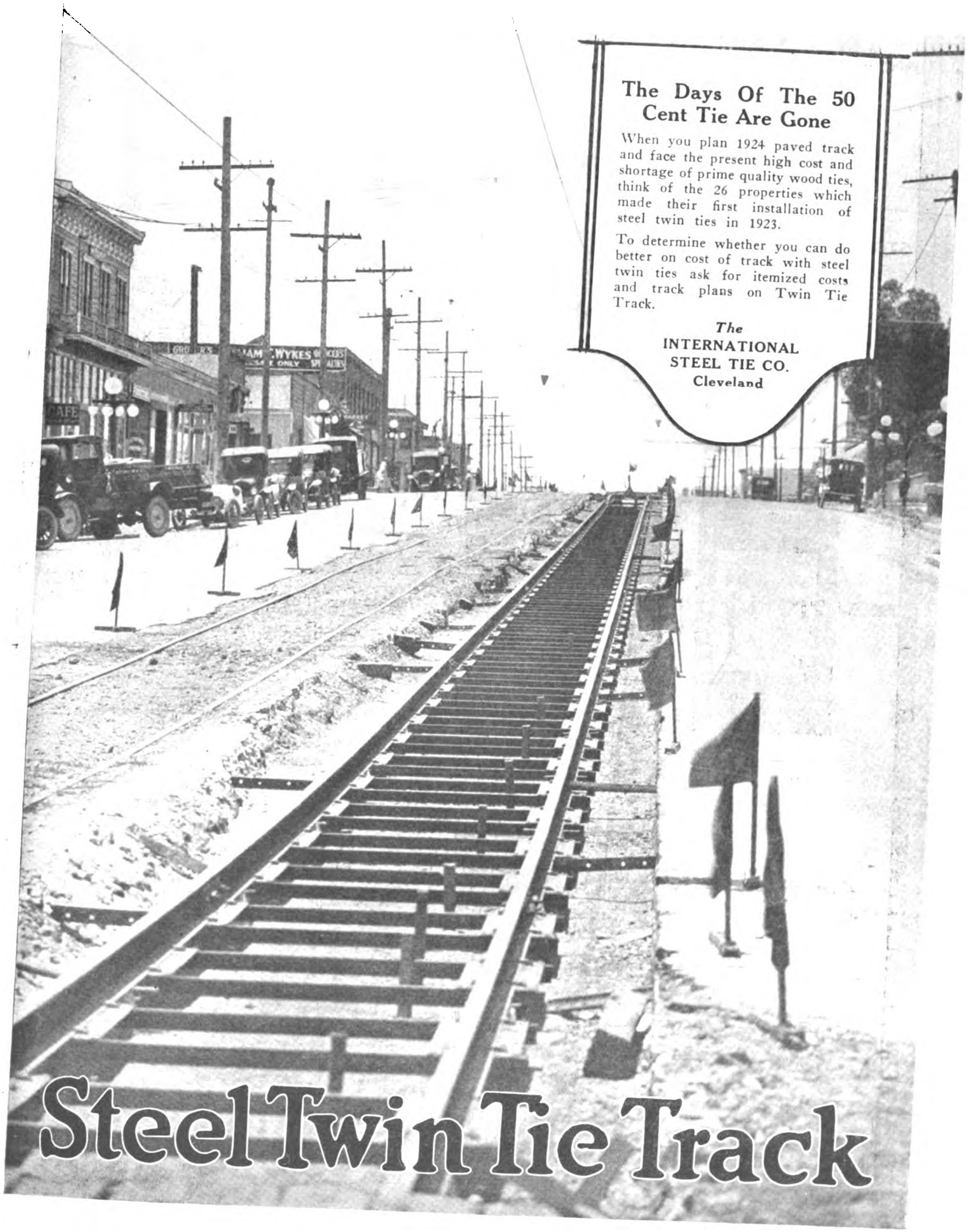
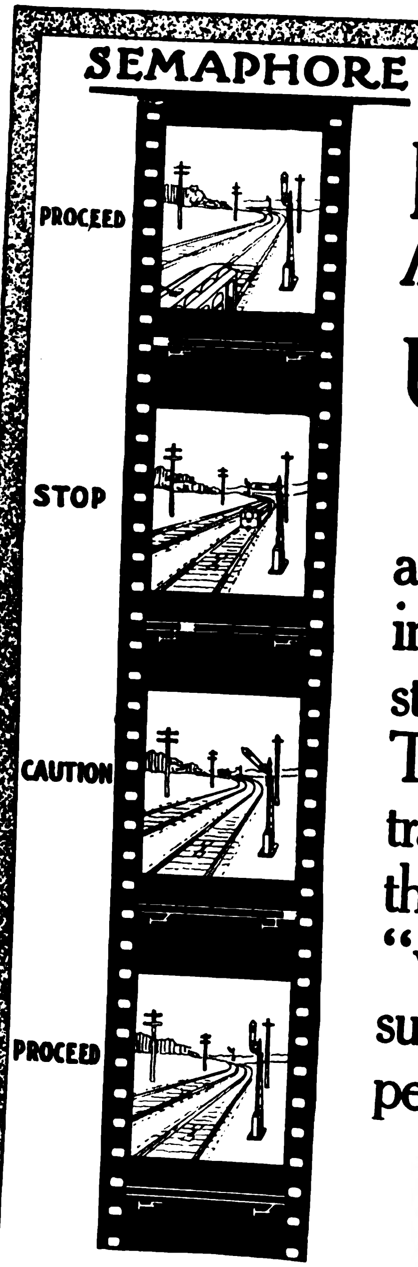

Steel Twin Tie Track
CAFE
GROCERS
WILLIAM E. WYKES
WHOLESALE ONLY
GROCERS
SPECIALTIES

The Days Of The 50 Cent Tie Are Gone

When you plan 1924 paved track and face the present high cost and shortage of prime quality wood ties, think of the 26 properties which made their first installation of steel twin ties in 1923.

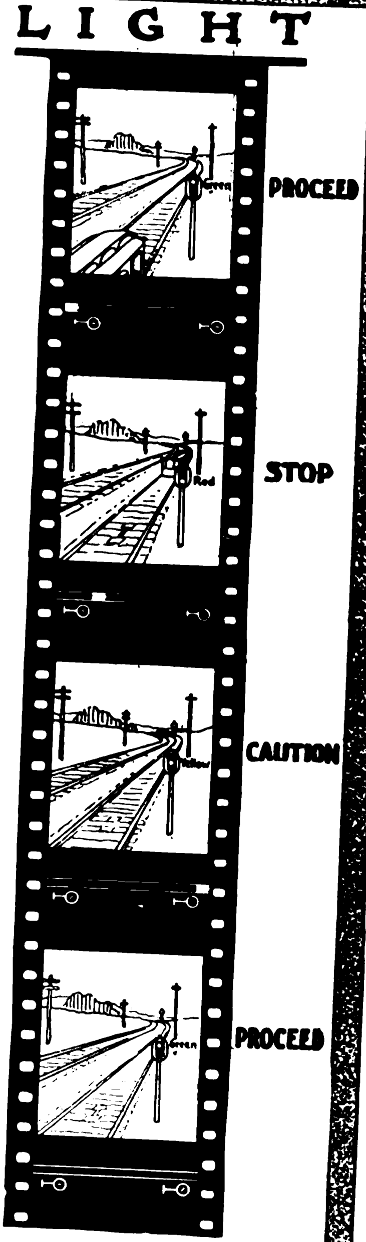
To determine whether you can do better on cost of track with steel twin ties ask for itemized costs and track plans on Twin Tie Track.

The
INTERNATIONAL
STEEL TIE CO.
Cleveland


SEMAPHORE
PROCEED
STOP
CAUTION
PROCEED

FOR DOUBLE TRACK
Interurban Railways

Union automatic
■ block signals ■
afford a simple system of indications easily understood by trainmen.
The continuous A. C. track circuit makes possible the use of "polarized" or "wireless" control and insures the display of the proper indication at all times.


LIGHT
PROCEED
STOP
CAUTION
PROCEED

On the W. B. & A. Railroad

UNION EQUIPMENT WILL SOLVE YOUR INTERURBAN TRAFFIC PROBLEMS

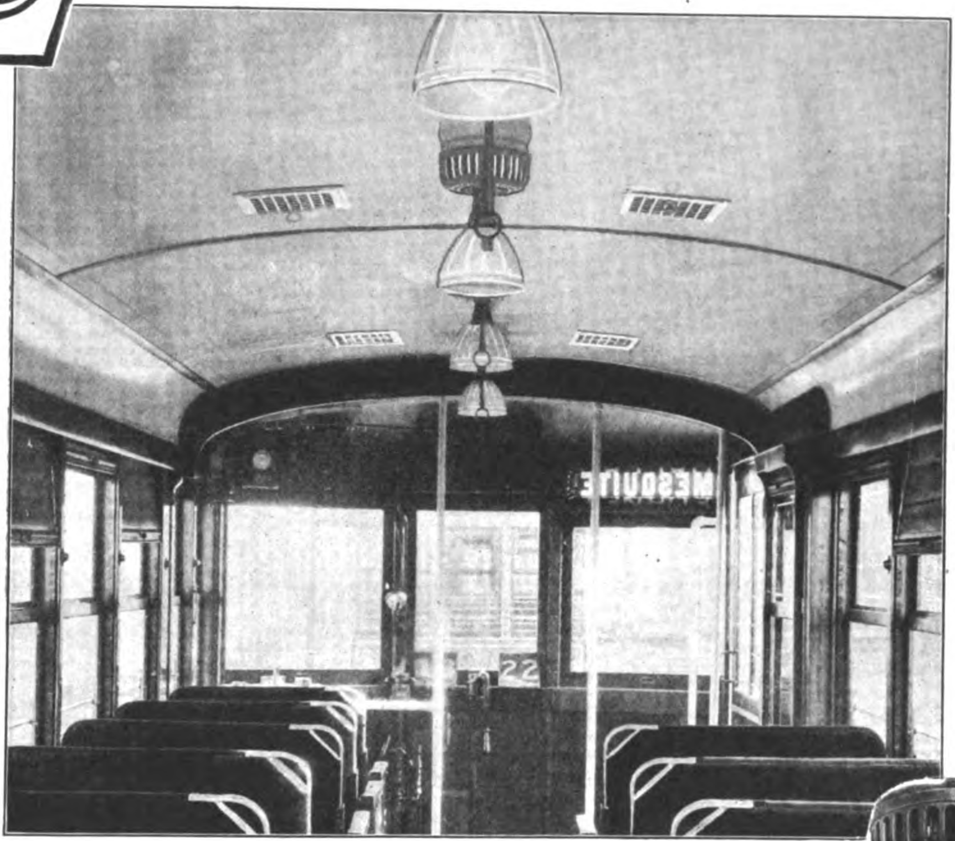
Let us study your operating conditions and cooperate with you in considering what *automatic block signaling* will do for *your line*.

Trade Mark

Union Switch & Signal Co.

SWISSVALE, PA.

Trade Mark



KEYSTONE

Compensating Fixtures

Car Lighting at Lower Cost

One series circuit of 5-94 watt lamps with Keystone Compensating Fixtures fills the place of several 5-lamp series of lower capacity.

With Keystone Compensating Fixtures, one circuit is enough, because the burning-out of any one lamp does not interfere with the other four. The Compensating system automatically recloses the circuit through a suitable resistance.

Less wiring, fewer lamps, lower current consumption and more economical maintenance.

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It's in the Gold Medal Brief

that won the 1923 Charles A. Coffin prize for the Chicago North Shore and Milwaukee Railroad—this statement:—

"If the cars are good and the roadbed in bad condition, the service will not satisfy the public."

AND

"Electric railroads must exert all their energies toward making travel fast, safe,

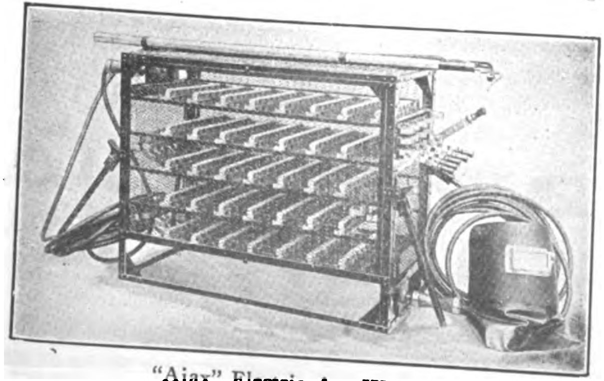
smooth and comfortable"

Smooth, comfortable track that satisfies the public is readily maintained by using the modern track grinding equipment shown here.

Full information regarding any type of rail grinder gladly sent on request.

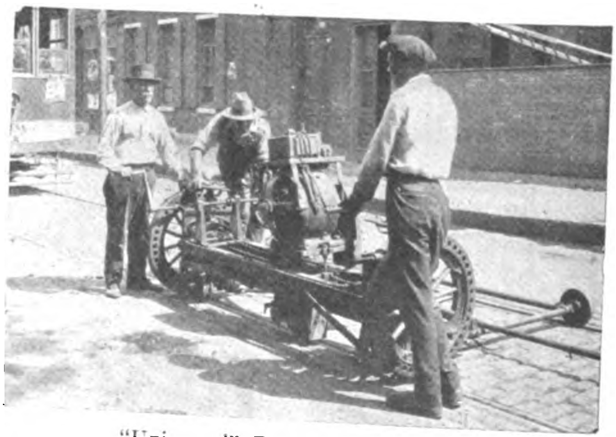
Railway Track-work Company
3132-48 East Thompson Street, Philadelphia

AGENTS:
Chas. N. Wood Co., Boston; Electrical Engineering & Mfg. Co., Pittsburgh; P. W. Wood, New Orleans; Atlas Railway Supply Co., Chicago; Walter M. Graham, Toronto; Equipment & Engineering Co., London.



"Ajax" Electric Arc Welder

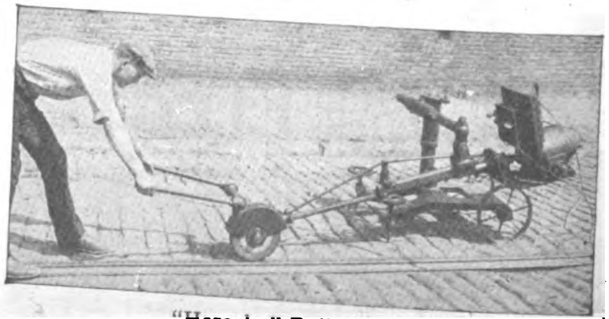
"Reciprocating" Track Grinder



"Universal" Rotary Track Grinder

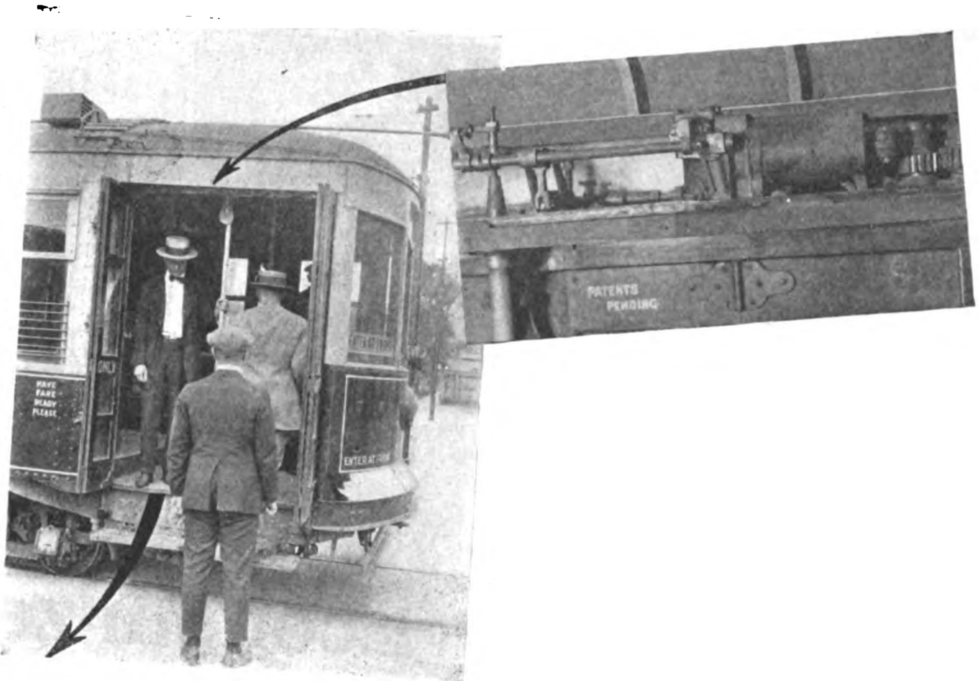
ATLAS RAIL GRINDER

"Atlas" Rail Grinder



"Hercules" Rail Grinder

The Automatic Door Car



Pneumatically Operated

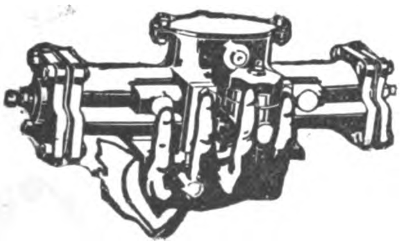
—a treadle built in the platform
—a connection through the stanchion
—a reliable door engine above

These points, briefly stated, tell what it is! What it does in actual operation was told in an article in the August 15th issue of Electric Railway Journal.

How you can apply it to your one-man cars, to speed up passenger interchange and safeguard fare collection, will be shown by our representatives.

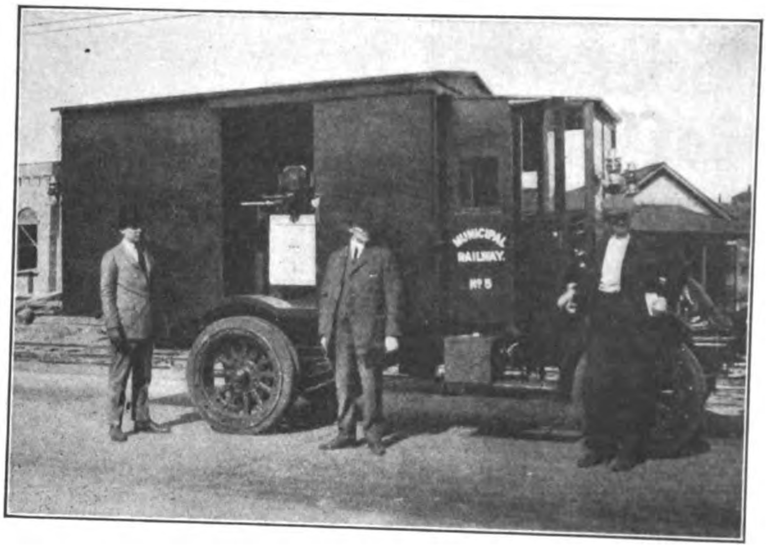
The Chicago cars with these devices have shown remarkable results. The automatic door operating mechanism is National Pneumatic throughout.

Write for further information



National Pneumatic Company, Inc.
Originators and Manufacturers
PRINCIPAL OFFICE: 50 Church St., NEW YORK
Philadelphia—Colonial Trust Bldg. Chicago—McCormick Bldg
Works—Rahway, New Jersey
Manufactured in Canada by
Dominion Wheel & Foundries, Ltd., Toronto, Ont.

NATIONAL PNEUMATIC EQUIPMENT



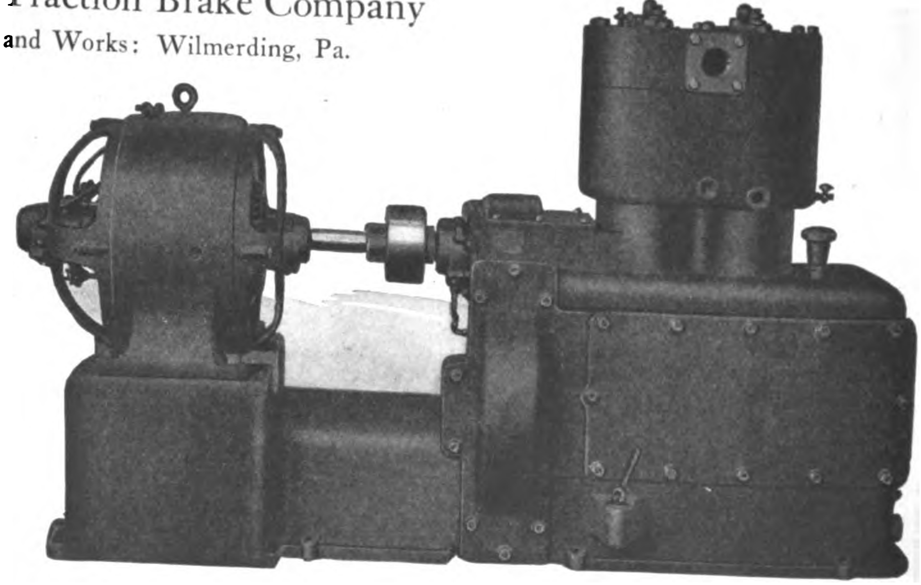
IN SEATTLE

The portable compressor outfit illustrated here was built by the Seattle Municipal Railways by mounting a Westinghouse-National E-4 Type Air Compressor on a second-hand 2½-ton chassis, with special body. The outfit operates four tie-tampers or two paving breakers and has saved in some cases as high as $100 to $150 per day in the cost of way maintenance work. It enables six men to do the work formerly done by thirty. The compressor has a piston displacement of 110 cu.ft. per minute and is equipped with Automatic Control.

You, too, can Economize!

COMPRESSED air can be employed for innumerable operations which are slow and costly when performed by hand. Westinghouse-National Industrial Air Compressors are built to meet every need of the electric railway field, and the satisfactory service which they invariably give has become a matter of tradition. The highest degree of economy is attained in the general plan of design and especially in the distinctive feature of Automatic Control. All types and sizes. Write today.

Westinghouse Traction Brake Company
General Office and Works: Wilmerding, Pa.



Westinghouse Type E-4 Compressor with Thermo-Syphon Cooling System

WESTINGHOUSE—NATIONAL
Air Compressors

"QUALITY MACHINES FOR QUALITY SERVICE"

From the brief that won the Charles A. Coffin Prize of 1923

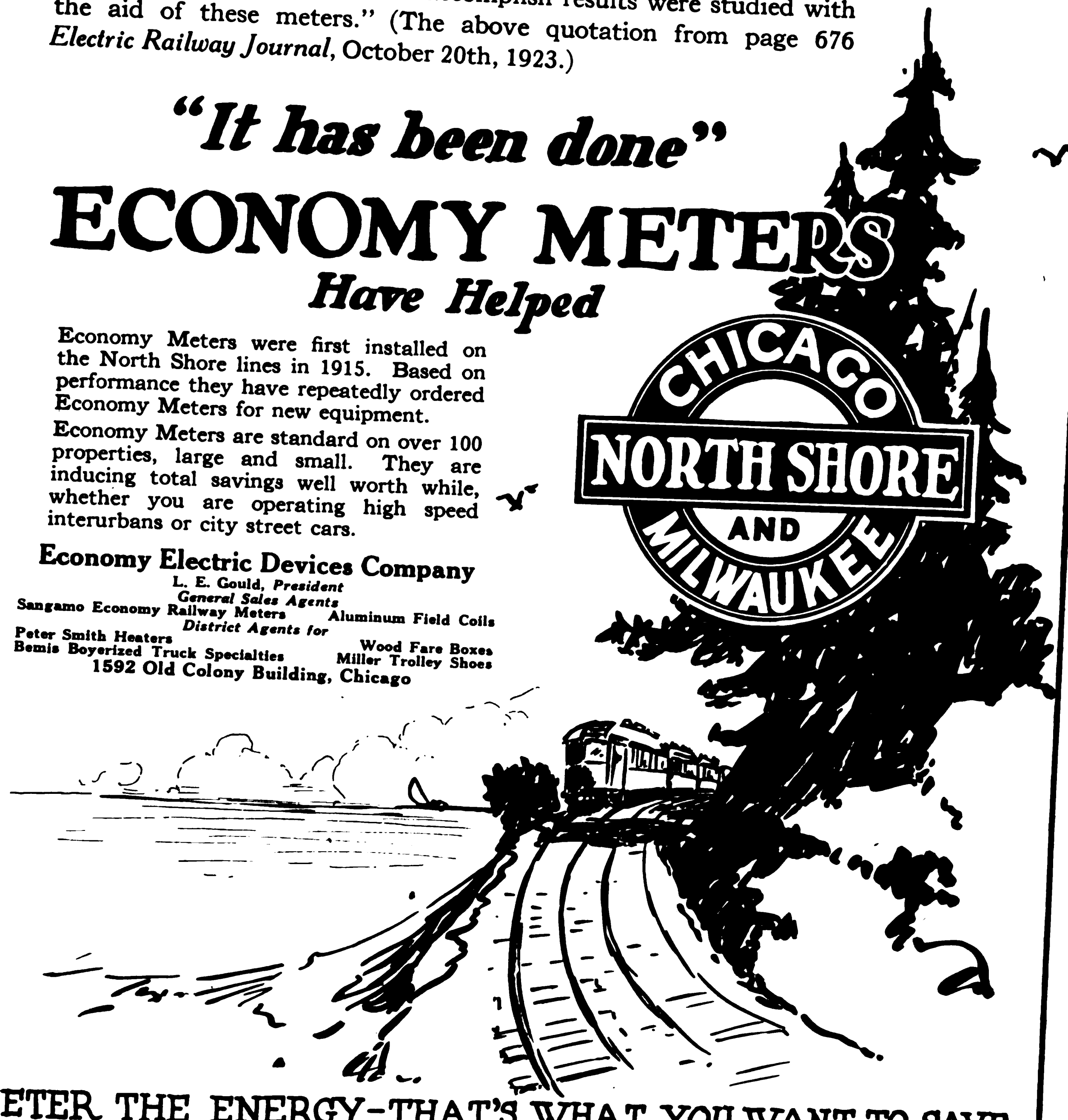
"Reduction of Power Consumption"

"Believing that the greatest economy can be had only by careful analysis of all items which enter into cost of rendering service, power recording meters were installed on all passenger equipment and accurate records kept of power required per car mile in all classes of service. The reduction in energy consumption which followed the installation of this metering equipment was due to several causes, but each of the steps taken to accomplish results were studied with the aid of these meters." (The above quotation from page 676 *Electric Railway Journal*, October 20th, 1923.)

"It has been done"

ECONOMY METERS

Have Helped



Economy Meters were first installed on the North Shore lines in 1915. Based on performance they have repeatedly ordered Economy Meters for new equipment.

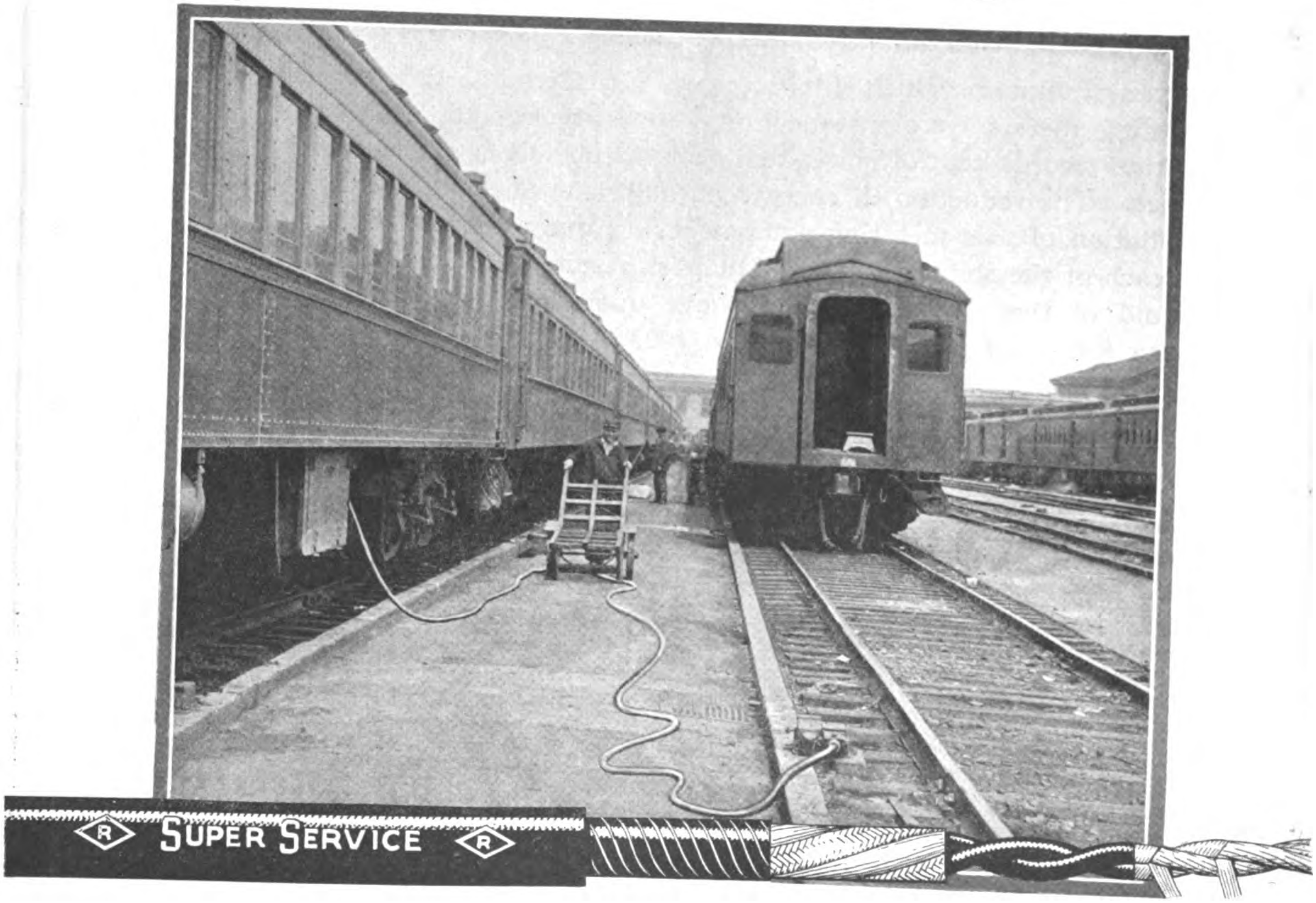
Economy Meters are standard on over 100 properties, large and small. They are inducing total savings well worth while, whether you are operating high speed interurbans or city street cars.

Economy Electric Devices Company
L. E. Gould, *President*
General Sales Agents
Sangamo Economy Railway Meters — Aluminum Field Coils
District Agents for
Peter Smith Heaters — Wood Fare Boxes
Bemis Boyerized Truck Specialties — Miller Trolley Shoes
1592 Old Colony Building, Chicago

METER THE ENERGY—THAT'S WHAT YOU WANT TO SAVE

ROME WIRE

Super Service Charging Cable



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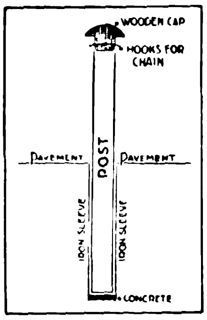
"It is thought that the new type affords as much protection as the concrete safety zone, if not more, and the cost is only a small fraction of the cost of the concrete. The cost of a concrete safety zone of similar size is about $1,600, while the new type costs slightly less than $400.



"The posts were set in the following manner: After the pavement was cut through, holes were bored to a depth of slightly more than three feet, and a little concrete was poured into the hole; then a sleeve 3-ft. long and 7-in. in diameter was dropped into it, and more concrete was poured around outside the sleeve. The posts, which are 6-in. in diameter, drop into this outer sleeve, thus being removable at any time, as they are not cemented or otherwise fastened. These hollow posts are 6-ft. long, which makes them extend 3-ft. above the pavement, but each is capped with a wooden plug, rounded, which gives the posts a more finished appearance and also serves to keep water from getting into them. This plug adds nearly 6-in. to the height of the post.

"With this type of safety zone, it is a simple and inexpensive matter to change the location. The lamp-post is bolted to the pavement, but the wiring is attached only by means of a slip connection beneath the base, so it, too, can easily be moved. It is estimated that the whole safety zone could be entirely removed in about one hour."

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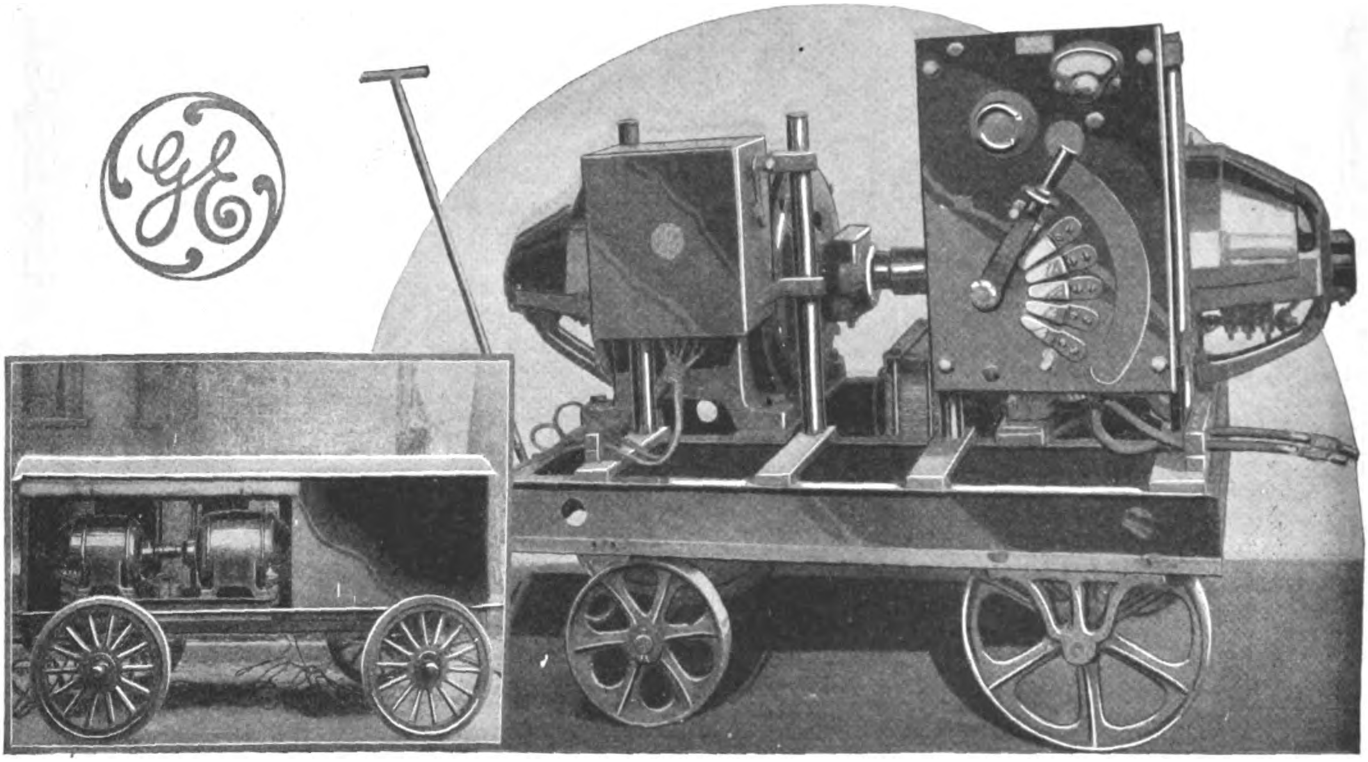

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GENERAL ELECTRIC

432-750

New York, Saturday, November 3, 1923

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review
Published by McGraw-Hill Company, Inc.
HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 62
Number 18

The Electric Railways Are Coming Back

SO MUCH evidence has accumulated showing the electric railways are coming back, that they now have a real story to tell to the financial world. An opportunity to do that came last week at the convention of the Investment Bankers' Association in Washington, D. C., and J. W. Welsh, executive secretary American Electric Railway Association, made the most of an invitation to speak on the electric railway situation. His address is presented elsewhere in this issue. It consists of a plain statement of facts, forming for the bankers inescapable proof that the electric railways are making noteworthy progress in working out their difficulties. They are surely coming back.

That was the most important message the industry had to give the investment bankers, for many of them have not been cognizant of the improving situation and have continued their disapproval of these securities. In reality the time is not far distant when electric railway securities are again going to be considered in the investment rather than the speculative class. And this the investment bankers want to know. So Mr. Welsh's talk was timely and helpful.

An Intensely Interesting Narrative of Railroad Development

LEST some readers may have missed it, special attention is directed to the publication in the JOURNAL for Oct. 20 of the brief of the Chicago, North Shore & Milwaukee Railroad submitted in the contest for the Charles A. Coffin gold medal prize. Every one interested in electric railways will find the reading of that brief most interesting and profitable. The editors of this paper were familiar with the matter set forth in the brief, as practically every accomplishment recorded there had been related in the JOURNAL as it was done. And the 1922 Annual Convention Number of the JOURNAL devoted fourteen pages to a story surveying all the things that had been done to build up this property.

Yet the editors found this brief—the road's own story of its accomplishment—the most interesting narrative of electric railway development they had ever read. It is a plain statement without embellishment of what has been done, the methods followed and the results obtained. It ought to be read and reread by every interurban railway man in the business, for it contains a host of practical, proved suggestions of things that can be done to build up a railroad. Of course it is realized that fundamentally this line had something to build on, but aside from having a good right of way between good terminal cities, few roads are any farther down the scale of physical and public relations imperfection, as a basis to build on, than was this line.

That the development of the road has involved more than ordinary progressiveness is reflected in the frequency with which it has been the subject of comment and articles in this magazine. Having thus followed the work of Britton Budd and his associates, the JOURNAL indorses the finding of the Coffin prize committee, for it believes a record of accomplishment is set up here that is without parallel in recent electric railway history. And the significant thing is that it has all been done by simple, ordinary means. There has been nothing spectacular or superhuman in the program. It is just the accumulative result of a thousand little improvements, but coupled with a sound, sincere policy of giving the public what it likes and wants.

The Motor Bus at the Convention

TO SHOW the progress of the electric railway industry toward acceptance of the motor bus, and the general thinking about the bus, it is interesting to bring together the gist of the discussion on this subject at the recent convention.

L. S. Storrs, president the Connecticut Company, observed that today we find the careful students of transportation in practical agreement that the two agencies (railway and bus) must be co-ordinated. As to how to establish co-ordination, he said that the necessary preliminary to any effort to co-ordinate these two agencies is a public opinion that will support legislation which recognizes that the two agencies are merely different means of providing a convenient and needed public transportation service, which must be unified in order that the various communities may have a thoroughly efficient transportation service at the lowest possible rate. We can talk all we please, he said, about co-ordinating these facilities, but we can accomplish nothing until public opinion is of a temper to accept the needed regulation. Real co-ordination devolves upon the transportation utilities, and a full measure of bus operation should be undertaken as rapidly as the need for service is apparent and funds available to provide the equipment.

Of the situation in California, where bus competition has been most intense, D. W. Pontius, vice-president and general manager Pacific Electric Railway, told of the material progress that has been made in correcting the situation—partly by the railways themselves going into the bus business and partly through legislation. The main point cited in correcting the situation was the legislation effected imposing a tax of 2 cents a gallon on gasoline and requiring that buses and trucks operating in common carrier service must pay to the state 4 per cent of their gross revenue.

Pertinent among the statements made by the committee on bus operation was one that if a railway company adopts the policy of providing all transportation needs in the territory served, the possibilities of the bus as an aid to such a policy cannot be overlooked. While noting that supplanting of existing rail lines with bus routes is a matter of economics, the committee acknowledges that it will be found that when rail lines with low earning power are faced with heavy rehabilitation or paving charges, the bus can be used as a means of continuing service with an expenditure for equipment much below the cost of plant renewals or paving. It is also asserted that the electric railways are becoming increasingly interested in the use of the bus in meeting the full requirements for transportation in the territory which they individually serve.

H. W. Alden, president Society of Automotive Engineers, the engineering association of the automotive industry, in a friendly discussion of the report of the committee on bus operation, pointed out how this report lacked comprehensiveness in several respects. He observed that the figures presented in the report would have been somewhat different if independent companies had been included, because a great many bus companies are making money. His principal mission in appearing before the railway association was to encourage and urge co-operation between the railways as bus users and the S.A.E., in order that designs of buses may be developed which will meet the requirements of service.

Another non-railway man who addressed the association was Alfred Reeves, general manager National Automobile Chamber of Commerce, the body which primarily looks after the business interests of the automotive industry. No progressive railway man could take exception to his remarks. Out of an interesting address, these few thoughts are worth repeating here. He said that with the present congestion of traffic and concentration of population, the trolleys cannot properly handle all street transportation. They cannot afford to build in sparsely settled territories. Nor can the bus do it alone. Think how many buses would be required, he says, to supplant the trolley which last year carried 15,000,000,000 passengers. A combination of trolley and bus seems to be the real answer. In certain fields of street transportation, the trolley is supreme in efficiency and economy. In other places, the bus holds a similar position. This demands that the two forms be co-ordinated. The prime consideration, therefore, is to fix the fields of endeavor which each shall enjoy.

Speaking of the opportunity which the bus affords to railway men, he said that as experts the trolley people have a rare opportunity to enter the bus field and thus give the public complete transportation. By hesitating, trolley men have missed some golden opportunities, although it is not too late if they will enter the field in the proper spirit. He offered the suggestion that unless the electric railway interests take steps to discharge the apprehension held by many people that if the railways take over the buses it will be for the sole purpose of bringing about their elimination, their entrance into this new field will not receive a proper welcome.

On the matter of regulation, he commented that the automotive industry is in accord with the railway industry, so far as it relates to state supervision of common carriers. He reminded the railway audience that more than two years ago the National Automobile Chamber of Commerce declared that control over motor vehicles as common carriers if deemed necessary should be placed in existing state commissions, and that as a prerequisite to operation the owner should be obliged to obtain a certificate of convenience and necessity. A proviso in this declaration was that lines in actual operation should *prima facie* be regarded as necessary.

The Opportunity of the Railway Association

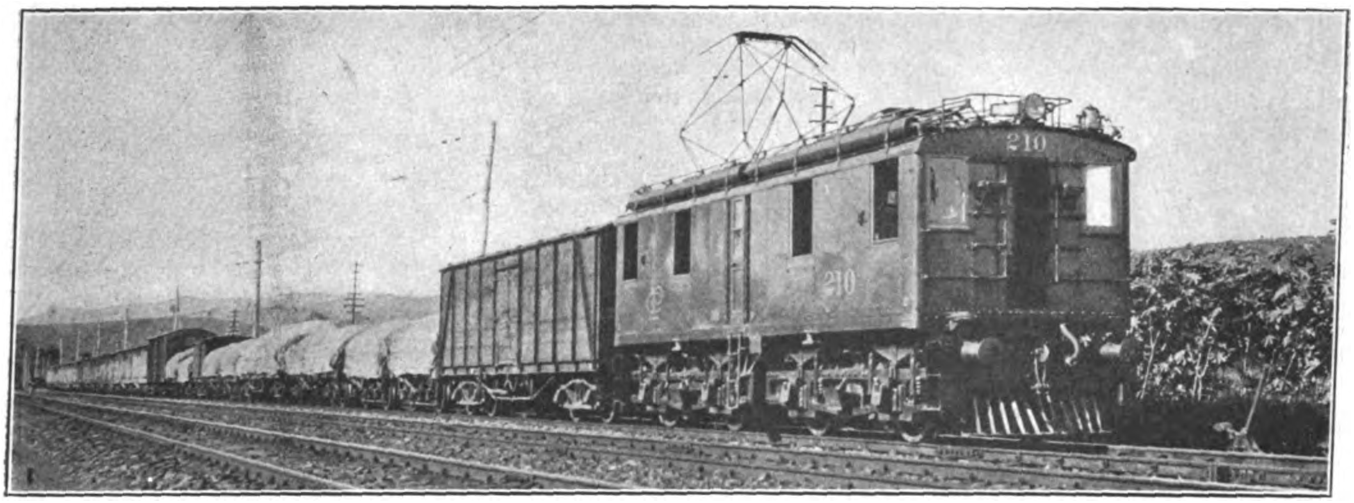
WITH the best thinking inside and out the railway association now concurring very largely in the desirability of co-ordinating bus with railway, and of preserving the monopoly of all transportation facilities in any community, it would seem that the American Electric Railway Association has such an opportunity for broadminded treatment of the bus problem that it cannot afford to miss that opportunity by permitting the reactionary spirit of a minority to hold it back longer in its position of partial aloofness.

Just now the principal organizations of the automotive industry and the leading manufacturers of buses are of a mind to co-operate with the American Electric Railway Association to the end that its members, rather than disinterested or antagonistic interests, may have prior opportunity to capitalize whatever usefulness the bus possesses. They prefer to have the railway men take hold of the bus. But if the association cannot soon see its way clear to accept in generous measure this offer of co-operation, and to take the lead in determining where and how the bus can be used, these automotive industry companies and associations will naturally direct their aggressive energies into other channels of development. There, their activities might be more harmful than helpful to present transportation companies. The transportation industries really have too many common interests to permit the few opposing ones to keep them apart, following separate courses.

The JOURNAL believes that the association might well now accept and encourage whole-heartedly the full co-operation and joint effort of the automotive industry associations. Furthermore, to make this movement effective, its membership should now be opened, on some basis, to those legally authorized bus companies which are established and recognized as permanent, dependable transportation agencies operating in a non-competitive way. Some change must shortly be made, anyway, to provide for membership of the bus subsidiaries of railway members, and of the companies where railway has been superseded by bus, but operated by the same company, and hence it is well to consider the whole question.

It appears now that the association can hardly postpone such action beyond the present association year without missing a really wonderful opportunity to bring together into one fold all of the interests pressing for the common objective of developing the transportation facilities available to the public. The basis of bus membership might be that of a bus section of the railway association, as suggested in ELECTRIC RAILWAY JOURNAL for Dec. 2, 1922, page 869, or any other plan that would bring all the transportation companies "into the family."

Unless all the energies of these various associations and railway and bus operating companies can be directed into a harmonious program, the prospect is a half-hearted co-operation at best, and much destructive competition. But with this harmonious program, the future of transportation is inspiring to contemplate.



Typical Brazilian Export Train Consisting of 700 Tons of Cattle and Coffee Hauled Electrically

Savings from the Paulista Electrification Estimated

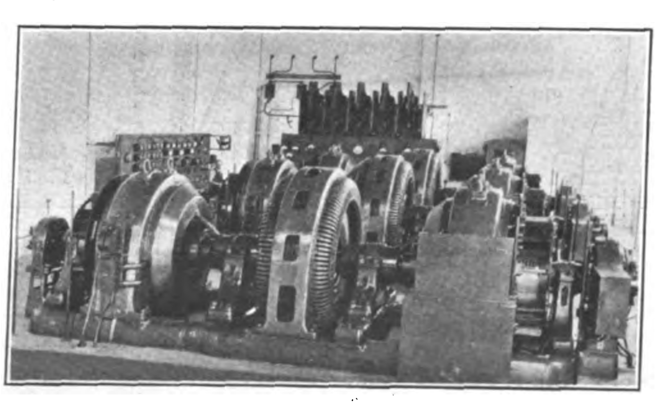
The Costs of Electric and Steam Operation Over a Period of Five Years Are Analyzed on Brazil's Important Main-Line Railway—Electrification Is Expected to Save as High as 65 per Cent of the Total Operating Cost—Fuel Is a Major Factor

By S. B. Fortenbaugh

Railway Engineering Department, General Electric Company

THE Paulista Railway, Brazil, furnishes an interesting example of a projected electrification where the only considerations involved in the decision to employ electric operation to replace steam were economy in operation and the general improvement of the service. This road recently contracted for the electrical equipment necessary for a 50-km. extension from Campinas to Tatú, in addition to its initial installation between Jundiahy and Campinas. This latest addition is in line with the original policy and intention to extend the electric service as far as Cordeiro, 206 km., and beyond as soon as the exchange situation becomes more nearly normal.

Brazil today produces practically no coal or fuel oil, the high price of imported coal and oil and consequent operating costs having originally led the Paulista company to utilize its natural and easily accessible sources of wood as fuel for the operation of its trains. Today obtaining a supply of wood for engine fuel is a serious and much more costly problem with the Paulista, the net result of this condition of affairs being a decision to push electrification and utilize some of the country's water-power development.

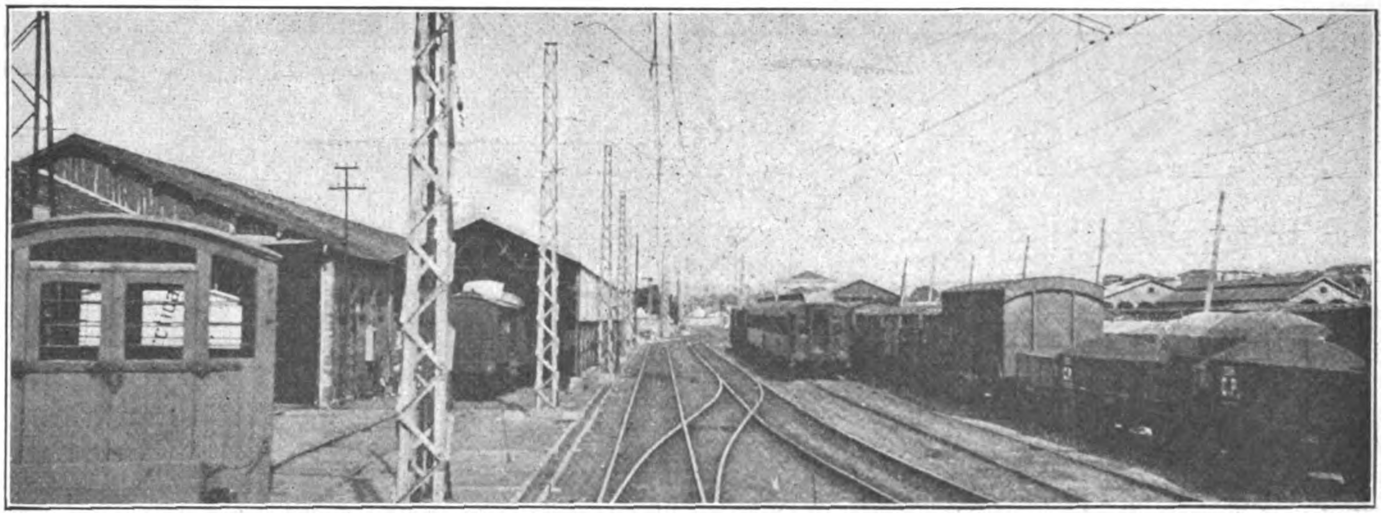


Interior of Louviera Substation, Paulista Railway

Coal—From an extended series of careful tests and observations it has been found that the ton-miles moved by an average of 7 lb. of coal on the engine tender of a steam locomotive is approximately equal to that which can be moved by 1 kw.-hr. input to the substation. This figure includes, for convenience of comparison, all the transmission and conversion losses inherent to electric operation, as well as the stand-by losses of the steam engine. It is sufficiently liberal and accurate, furthermore, to include all classes of service, miscellaneous switching, etc., and any usual and reasonable variation in the kind and quality of coal.

This figure of 7 lb. represents the amount of coal burned on steam engines to get the equivalent tonnage movement of 1 kw.-hr. delivered from an electric power station. From this it follows that 1 ton (2,000 lb.) of coal on the engine tender is the equivalent of approximately 286 kw.-hr. of delivered electric power.

Wood—As a result of a survey of Brazilian steam railway practice, it has been determined that the work done by 1 ton of coal is equal, on the different railways, to that accomplished by from 8 to 9.3 cu.m. of wood. Assuming 8.5 as an average figure,



Campinas Yards, Where Much of the Freight Classification Is Done

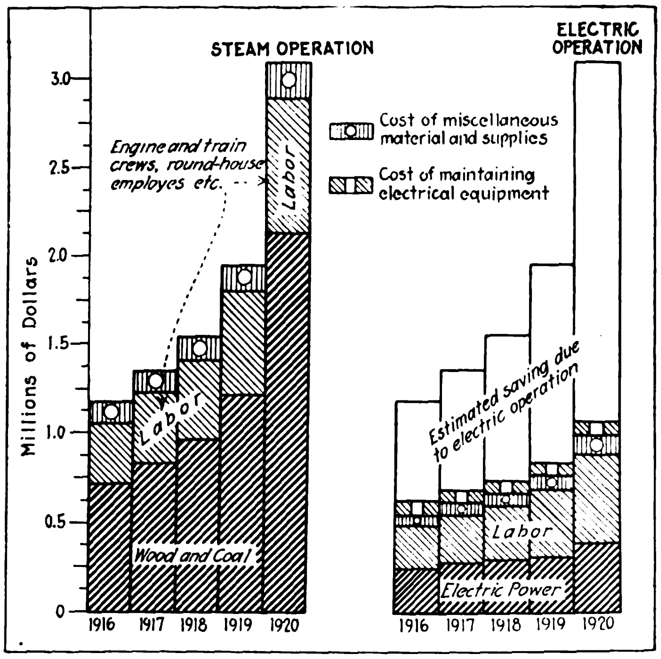


Fig. 1—Comparative Costs of Conducting Trains, All Lines

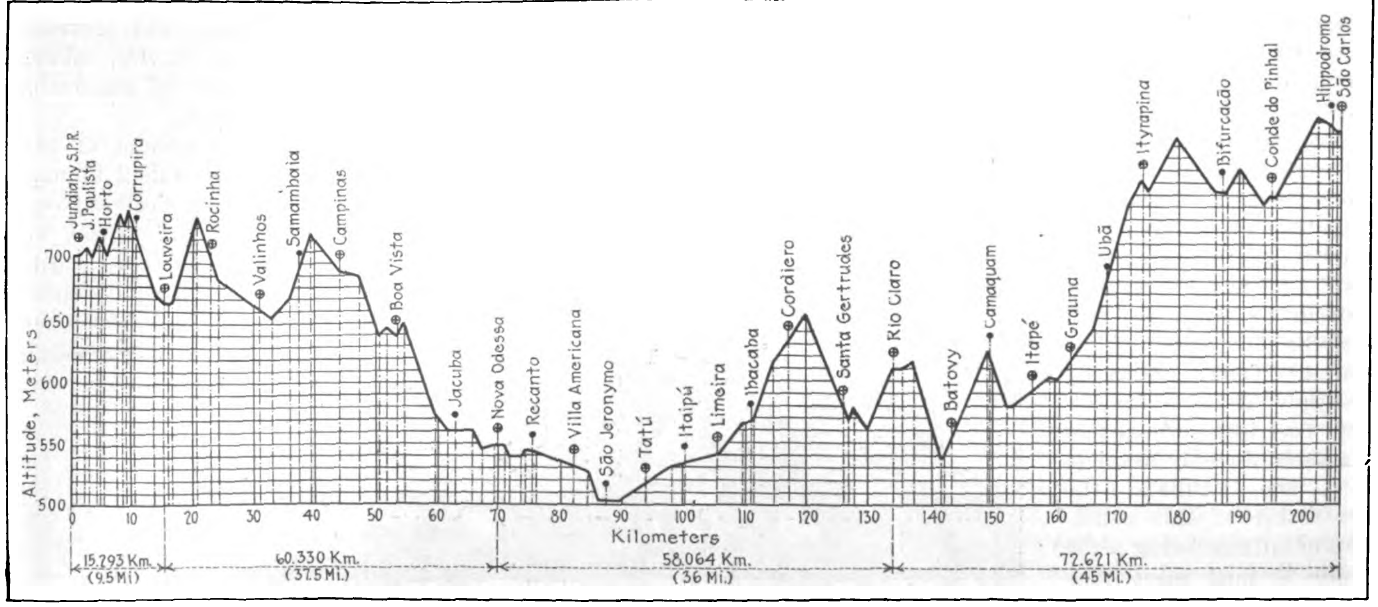
1 cu.m. of wood burned on the steam engine is the equivalent, in work done, to approximately 33.6 kw.-hr. of delivered power.

During the last twelve years the average annual cost of wood per cubic meter has increased from approximately 90 cents to $2.15 in 1922. This is equivalent to purchasing electric energy at rates ranging from 2.75 to 6.35 cents per kilowatt-hour. Power has, however, been contracted for by the railway on a long-term basis at approximately 1 cent per kilowatt-hour.

POSSIBLE SAVING OF 85 PER CENT OF FUEL COST

Investigation indicates a possible reduction in the total cost of fuel, based on the existing contract price for electric power, ranging from approximately 40 to 85 per cent for the years 1910 to 1926, inclusive. This is a very large proportion of the total operating expense, and clearly shows the wisdom of the Paulista Company's decision to substitute electric for steam traction. The indications are that the savings effected in fuel alone will more than fully justify the capital expenditure required for electrification.

Table I gives the Paulista's actual operating costs of conducting trains on all lines for the years 1916-1920



Profile of Portion of Paulista Railway Which May Be Electrified Eventually
With completion of the new contract recently announced the section between Jundiahy and Tatú will be under electrification, constituting half of this route.

TABLE I—TOTAL OPERATING COSTS, PAULISTA RAILWAY, BRAZIL—CALENDAR YEARS OF

	1916	1917	1918	1919	1920
Steam operation (actual):					
Waste	$9,250	$8,500	$11,750	$12,500	$14,250
Water supply	11,750	8,500	10,250	10,000	23,500
Lubricants	49,500	51,500	50,500	53,500	86,250
Miscellaneous supplies	39,000	46,000	53,500	62,750	77,000
Total	$109,500	$114,500	$126,000	$138,750	$201,000
Labor	352,500	401,500	447,250	586,000	756,500
Fuel	710,500	824,000	955,500	1,205,500	2,114,750
Grand total	$1,172,500	$1,340,000	$1,528,750	$1,930,250	$3,072,250
Electric operation (estimated):					
Miscellaneous material	$54,750	$57,250	$63,000	$69,500	$100,500
Labor	235,000	267,750	298,250	390,500	504,250
Electric power	241,000	274,750	294,000	297,750	384,250
Maintenance electric equipment	75,000	75,000	75,000	75,000	75,000
Grand total	$605,750	$674,750	$730,250	$832,750	$1,064,000
Estimated saving with electric operation:					
Total	$566,750	$665,250	$798,500	$1,097,500	$2,008,250
Per cent	48.3	49.7	52.3	56.9	65.3

TABLE II—OPERATING COSTS, PAULISTA RAILWAY, BRAZIL SEVEN MONTHS, JUNE-DECEMBER, 1923

	Cents per Train-Mile Steam	Cents per Train-Mile Electric
Fuel or electrical energy	37.56	13.09
Conducting trains:		
Engineers and firemen	7.63	5.13
Other train expenses	6.88	4.03
	14.51	9.16
Locomotive repairs:		
Labor	2.99	1.40
Material	6.12	0.92
	9.11	2.32
Substation:		
Labor		1.79
Material		0.25
		2.04
Secondary distribution:		
Labor		0.74
Material		0.12
		0.86
High-tension transmission line:		
Labor		0.23
Material		0.02
		0.25
Totals	61.18	27.72

inclusive, and also the estimated costs for the same period assuming equivalent electric operation. All figures are given in United States dollars on the basis that $1 equals 4 milreis (4$000). The estimates are based on a previous detailed investigation of the 1918 service, and for this reason they are submitted as approximate values only, but with the belief that they are well within the probabilities and are reasonably accurate.

An inspection of these data indicates the magnitude of the possible saving. It is largely a question of fuel vs. electric power.

The estimated cost of the operating force, engineers, firemen, train crews, etc., for the electric service has been assumed at two-thirds of the actual value under steam operation. Experience has shown conclusively that the savings to be expected from such items as the increased speed, heavier trains, reduced engine and train mileage are well within the limit suggested. The marked reduction in the cost of miscellaneous material and supplies, including roundhouse charges, the entire elimination of water tanks, ashpits, etc., will effect an estimated saving in these items of not less than 50 per cent in favor of electric service.

In order to complete the picture a liberal amount has been added to the electric service for the operation and maintenance of the required substations, transmission lines and secondary distribution. This is a relatively small proportion of the total expense, and necessarily speculative, but no possible or probable change in this item can have any material effect on this general comparison of the two methods of railway operation:

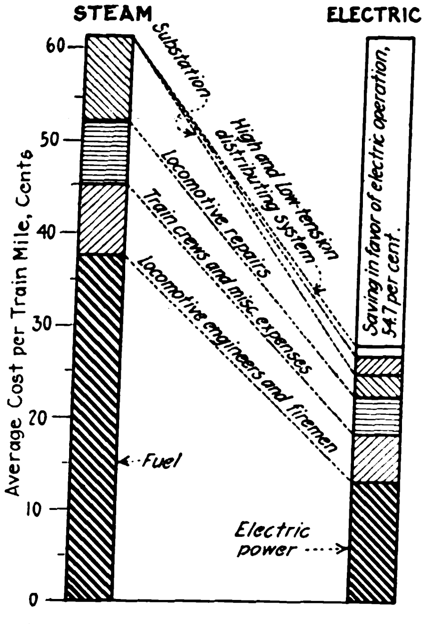


Fig. 2—Comparative Costs of Steam and Electric Operation, June-December, 1922

ONLY MORE EVIDENT SAVINGS INCLUDED IN THE ESTIMATE

This startling picture includes only the more evident of the direct savings effected by the substitution of electric for steam traction. The indirect savings to be effected by increased speed and capacity, reliability, convenience in operation, etc., are virtually impossible of accurate determination on a purely engineering basis, but of sufficient magnitude and importance to demand the most careful consideration.

The complete change from steam to electric traction on the section between Jundiahy and Campinas, approximately 27.5 route-miles of double track, was made about a year ago and the costs for the first seven months, June to December, 1922, are now available for the first time. The corresponding steam operating costs for the remainder of the Paulista Company's broad-gage lines (a total of approximately 150 route-miles of single track) are presented herewith for comparison. These values have been converted into United States currency of the basis of 7 milreis (7$000) to the dollar and are therefore approximate only as regards the actual amount in United States currency. The relative values are definite, however, and independent of the conversion factor used. This comparison is shown both graphically and in tabular form. Fig. 1 shows the estimated saving due to electric operations based on actual steam operating costs for 1916 to 1920 inclusive. Fig. 2 shows the difference between steam and electric operating cost for the last seven months of 1922. This comparison, while on a different mileage basis, nevertheless clearly shows how near the estimate made in 1920 came to the actual results now being obtained in the operation of the electrified section of the Paulista.

All permanent notices for display in the cars of the Montreal Tramways are made of neat blue and white decalcomania. Only in the case of one-day or one-week campaigns are paper posters placed in the cars, as it is believed that dirty, ragged paper notices seriously detract from the appearance of the vehicles.

Traffic Survey in Los Angeles

Street Congestion Is Particularly Severe in Los Angeles, Because of the Narrowness of Its Downtown Streets—Remedial Measures Are Suggested in Report Just Issued—Methods of Determining What Constitutes Adequacy of Service Also Discussed

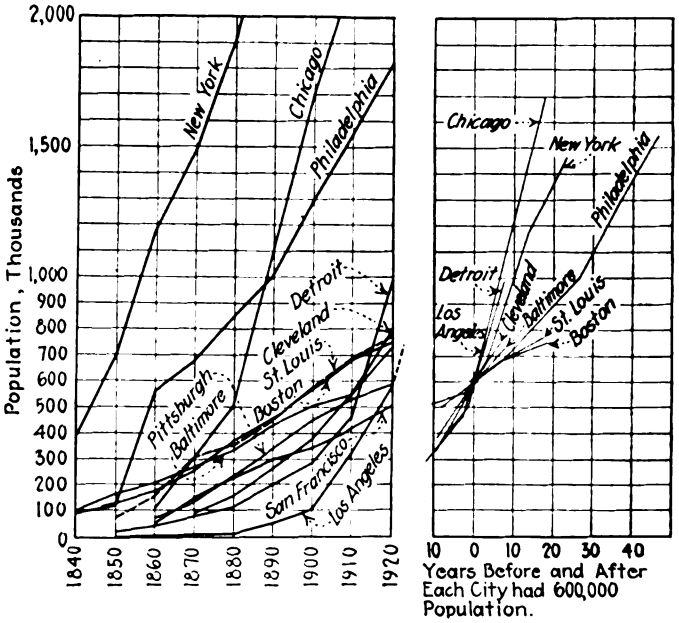
A TRAFFIC survey has recently been completed in Los Angeles for the Los Angeles Railway Corporation by Joe R. Ong of Piqua, Ohio. Los Angeles, Mr. Ong points out in the early part of his report, is a rapidly growing city, as shown by the accompanying population chart, and its expansion in population and activity has increased the concentration in the central business area. This has introduced complications in many directions, one of which is transportation.

It will be noted from one of the charts that the automobiles in Los Angeles County are increasing at a much faster rate than either population or passengers carried by the Los Angeles Railway. This increased use of automobiles has materially affected the traffic of the Los Angeles Railway Corporation. Statistics of the service given by other public utilities is also charted. All show a larger annual rate of increase in the last four years than in earlier years. In street railway traffic there was, following 1913, a period of actual decrease in passengers carried, and not until 1919 did the traffic exceed that in 1913. Another chart shows, on a logarithmic scale, the passengers and car mileage by months since 1916. It will be noted that the maximum mileage was in the year October, 1917, to October, 1918. In the latter month there was a somewhat belated curtailment, because the traffic began to fall off in 1914. Since 1918 there has been little change in the average monthly car mileage, though, through rerouting, the service was improved in 1920. The irregular sawtooth mileage curve is largely due to the difference in the monthly total of a thirty-one day month as compared with a thirty-day month. The low mileage shown in August and September of 1919 was caused by a strike.

TRAFFIC CONGESTION FROM AUTOMOBILES

There is no magic, says the report, that will relieve traffic congestion. It is a matter largely beyond the control of the street railways. It requires the cooperation of all interests in the community, as well as a vast amount of education. Any solution of the traffic congestion problem will unquestionably curtail the liberty of some individuals. Thus far, the individuals owning automobiles and the merchants, who (mistakenly) believe that their customers are largely automobile users, have effectively blocked sincere efforts to relieve the traffic congestion by non-parking regulations.

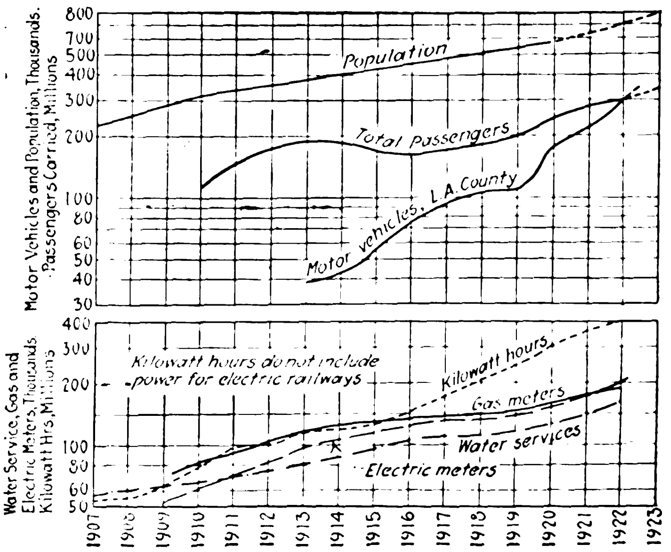
The time was when it mattered little in what kind or size of vehicle an individual used to come downtown. It mattered little where, when, in what position or for how long he left this vehicle standing in the public streets. Those days have gone. There are so many automobiles and trucks in the central business area that parking space along the curb for any significant number of them is absolutely out of the question. There is an ordinance against "second line parking" or the parking of a vehicle parallel to a machine that is parked at the curb. This ordinance, the report says, should be strictly enforced and extended so as to clear the congested area of all automobile parking, leaving curb space for a limited business delivery and pick-up service and for passenger cars just long enough to permit persons to board and alight.



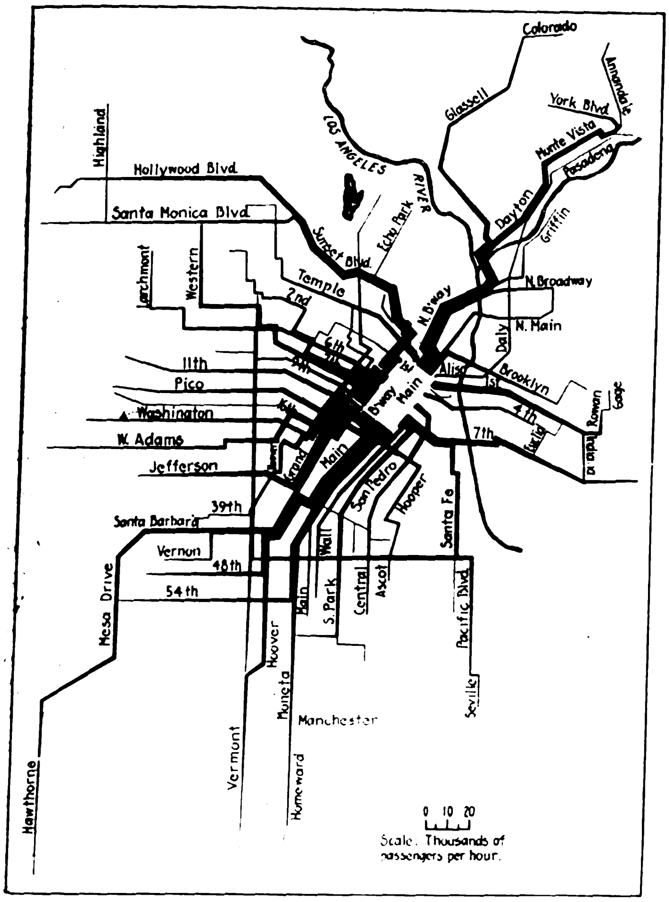
Population and Comparative Growth of Large Cities. At Right, the Population Curves at 600,000 Have Been Superimposed for Comparison

Los Angeles has relatively a small percentage of street area in the congested business section, perhaps a smaller percentage than any other city. There is much interest in street-widening projects, involving millions of dollars, but the least expensive method of widening the streets for the movement of traffic is to eliminate parking. Even single-line parking on certain very narrow streets greatly impedes traffic movement.

Business men in Los Angeles have mistakenly opposed non-parking ordinances, thinking they drive trade away.



Statistics Since 1907 of Population, Passengers Carried on Los Angeles Railway, Use of Other Utilities


Colorado
Glassell
York Blvd
Annandale
Monte Vista
Pasadena
Los Angeles River
Dayton
Griffin
Echo Park
Sunset Blvd
Highland
Hollywood Blvd.
Santa Monica Blvd.
Larchmont
Western
Temple
2nd
6th
7th
8th
11th
Pico
Washington
W. Adams
Jefferson
39th
Santa Barbara
Vernon
48th
54th
Mesa Drive
Vermont
Hoover
Moneta
Homeward
Manchester
Hawthorne
Grand
Main
S. Park
Wall
Central
Ascot
Hooper
San Pedro
Santa Fe
Pacific Blvd
Seville
N. B'way
B'way
N. Broadway
N. Main
Daly
Aliso
1st
Brooklyn
4th
7th
Rowan
Gage
0 10 20
Scale: Thousands of passengers per hour.

Map of Los Angeles Showing Passenger Traffic Flow During P. M. Rush on All Lines of Los Angeles Railway and on City Lines of Pacific Electric Railway

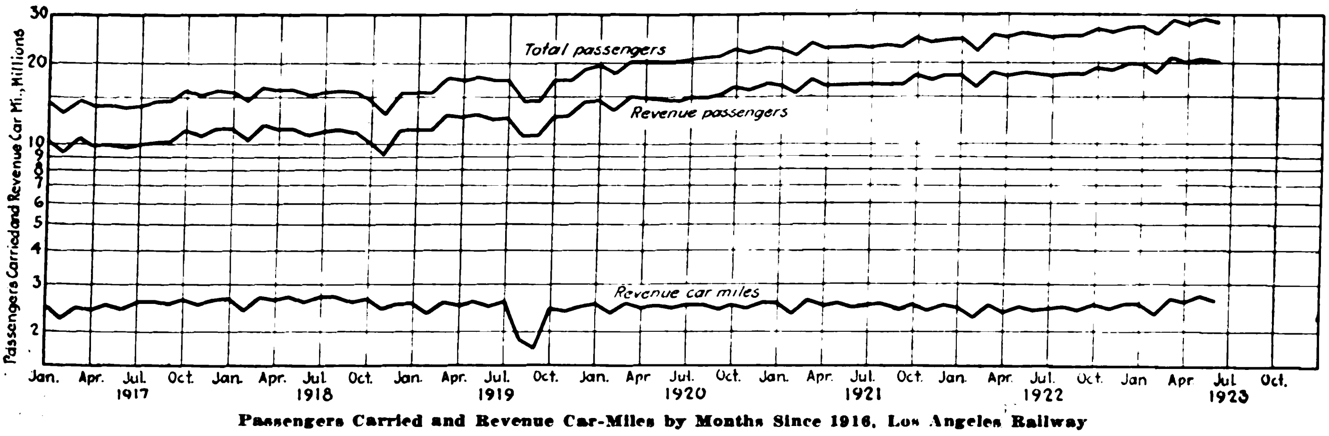
There is not a merchant who could survive on the business he gets solely from customers who park in front of his establishment. The ordinance prohibiting parking in the central congested area, passed in April, 1920, was repealed after a short trial of two or three weeks because of violent opposition on the part of the Broadway Merchants' Association, but they failed to submit actual data in support of their contention or to realize that automobiles parked at the curb do not indicate customers in their stores. Other limited parking ordinances have proved ineffective, partly because they have not been strictly enforced.

Unfortunately, the great mass of the traveling public, being unorganized, is never proportionately represented in hearings and investigations of the traffic problem, and the suggestions of the railway company, whose interests are largely the same as this public, are looked upon as selfish. Nevertheless, the street car rider is entitled to more consideration than he has had in the past. The street car is the unit best adapted to handle mass transportation, and mass transportation is the problem in the congested areas. Recent observations at the corner of Seventh Street and Broadway during the evening rush hour showed 191 street cars and 668 automobiles using Broadway, but the passengers on the street cars totaled 14,325 and those using the automobiles totaled 1,169. It is doubtful if the actual capacity of the streets for automobile movement would be increased more than 50 per cent if the street cars were eliminated entirely.

An accompanying illustration shows an analysis of the time distribution of street railway traffic by twenty-minute periods. Thirty-two per cent of all inbound travel occurs by 9 a.m., 50 per cent by 12:10 p.m., 75 per cent by 4:40 p.m. and 95 per cent by 8:20 p.m. Only 14 per cent of the total outbound travel occurs by 9 a.m., 23 per cent by noon, 50 per cent by 4:40 p.m., 75 per cent by 6:10 p.m., and 90 per cent by 9 p.m. The map on this page shows the distribution by lines of the outbound passengers between 5 p.m. and 6 p.m. The local city passengers on the Pacific Electric Railway are included in this chart, but are in addition to the 55,600 Los Angeles Railway passengers.

POSSIBLE REMEDIES BESIDES NON-PARKING

During the war a great deal of prominence was given to the question of staggered hours for opening and closing of stores, offices, and factories for the purpose of spreading out the rush-hour travel peak. This matter has been discussed in Los Angeles as a possible aid in the relief of traffic congestion, but an examination of the rush-hour peaks shows that while they are pronounced, they are fairly well spread. There are more than 13,000 passengers per twenty-minute period for four consecutive twenty-minute periods in the morning rush inbound, and in the next period there are possibly 12,000 passengers. To be of any material benefit in spreading out the peak, some of the travel would have to be shifted to near 9 o'clock in the morning, and outbound travel to 6:20 to 6:40 p.m. It is very unlikely that any group of employees can arrange to start work at 9 a.m. and can be held after 6 p.m. The staggered-hour plan is of greatest value, practically, when applied to large industrial concerns employing thousands at concentrated points and served by a limited number of street car lines. Too much should not be expected of it in other circumstances, for its application in offices and stores in a central business district would change the hours of a large number of employees not concentrated under one management.



Passengers Carried and Revenue Car-Miles by Months Since 1916, Los Angeles Railway

Some gain has been secured by double berthing or triple berthing of street cars at congested crossings. Another gain would be obtained by an ordinance requiring automobiles, trucks, and other vehicles to stay off the street car track zone except at street intersections. An aggravating situation arises whenever there is a street parade in the central business area. Vehicles can usually detour, but street cars get little consideration. Relief should be sought through the creation of public sentiment by education and publicity demanding municipal regulation of parades, restricting them to streets which will cause a minimum of delay to the city's transportation service. Co-operation with the other utilities may help to reduce interference to street traffic caused by the opening up of manholes and conduits unnecessarily.

ANALYSIS OF ADEQUATE SERVICE

Too much stress cannot be laid upon the absolute necessity for a systematic and continuous traffic survey by the schedule department. The only commodity the Los Angeles Railway has to sell is service. The service ought to be adequate—commensurate with the fare.

Adequate service has four outstanding features:

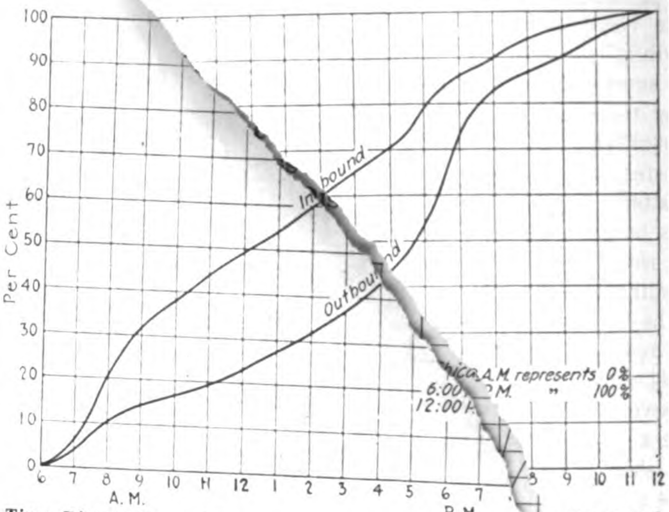
1. Sufficient cars to handle the traffic.
2. Cars operated frequently enough to serve a reasonable convenience.
3. Cars that run with regularity.
4. Cars that run with speed, not recklessly but fast enough to satisfy the passenger that he is getting somewhere.

Commenting briefly on these four points it may be said:

1. "Sufficient cars to handle the traffic" does not mean a seat for every passenger at all times. The American people do not expect it nor want it, though they sometimes think they do. During off-peak periods there should be approximately a seat per passenger after making allowance for those who prefer to stand. Standing by preference is still a real factor on the California type car with its closed center section and open end sections, smoking being permitted in the front open section. During rush hours adequate service contemplates cars loaded to comfortable carrying capacity. The number of standing passengers that may be carried on a car and be within the limits of comfortable carrying capacity is determined by the width of aisles, arrangement of seats, amount of unobstructed floor space and the arrangements of entrances and exits.

2. "Cars operated frequently enough to serve a reasonable convenience." During the off-peak hours the travel on many lines is so light that it becomes a question not of how many cars must run to handle the passengers but how infrequently can they be scheduled and still serve a reasonable convenience. The distance of the territory from the business section of the city, or from some other traffic center, the proximity of other lines and perhaps the density of population in the territory served, are some of the factors having a bearing on the required frequency of cars to serve a reasonable convenience.

3. "Cars that run with regularity," not that the time interval between cars should be the same at all periods, but that cars should be on time at the intervals prescribed in the schedules. In other words, cars must be on time, neither late nor ahead of time. Even a minute makes a difference. If the first car is one minute ahead of time, and the second car is one minute late, and the prospective passenger has just missed the first car, it means that he must wait two minutes longer than the schedule maker intended for him to wait. Not only that, but the second car has a larger load than its share because it followed a time interval two minutes longer than the schedule maker intended. It seems particularly hard to convince old motormen of the disastrous effects on the service of running a minute or two ahead of time.



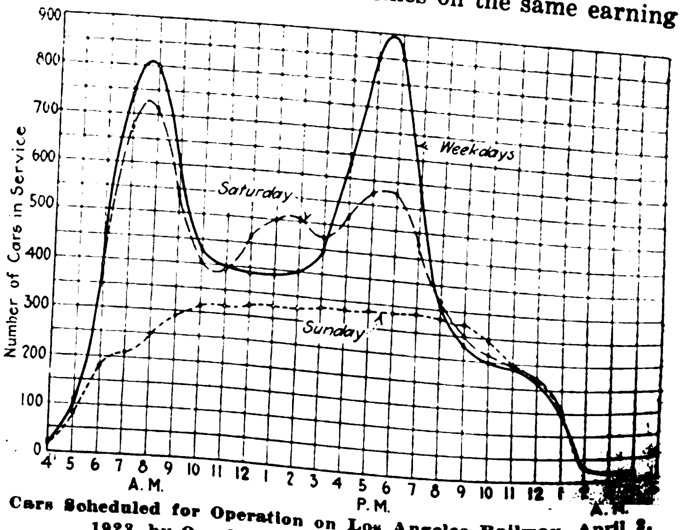
Time Distribution of Travel on Los Angeles Railway [illegible]. Expressed in Cumulative Percentages by Twenty-Minute Periods

4. The fourth element mentioned as being a factor in adequate service is speed. "Cars that run with speed, not recklessly, but fast enough to satisfy the passenger that he is getting somewhere." Safety first, of course, but up to a certain reasonable limit it cannot be said that accidents increase with speed; speed is not the controlling element in accidents. Slack time in schedules should be taken out. People living in an automobile age demand speedy transportation.

It is at once apparent that the character of the schedules has a vital bearing on items 1, 2 and 4 referred to above as factors in adequate service. Item 3 is largely a matter of supervision and discipline.

The importance of the schedule department of the electric railway is too often overlooked. It is one of the very vital spots of the railway. Correct schedules can show profitable operation on a given fare and satisfy the traveling public with adequate service. Incorrect schedules on the same fare might show too much service and too little return, or too much return and too little service.

It is not possible to put all lines on the same earning



Cars Scheduled for Operation on Los Angeles Railway, April 2, 1923, by One-Hour Periods Throughout the Day basis because of the variable factors—such as the length of the line, the speed at which it can be operated, the number of passengers carried, their distribution along the line and their distribution by time periods throughout the day. On a flat-fare and a universal-transfer basis some lines will never show a profit. If an attempt were made to reduce the service on these lines to a point that would materially pull down the expense per passenger it would cause such an overcrowding of cars that the traffic offering itself could not be handled, causing a reduction in revenue as well as a reduction in expense so that the net per passenger would still not show a profit. Such a situation prevails on several lines in Los Angeles, notably those which have a high percentage of transfers. The good lines that show a profit must help carry the poor lines that show a loss.

It must therefore appear evident that an adjustment of service to make all lines show approximately the same profit per passenger or to provide the same number of car-seat-miles per passenger is not the goal to be attained. The auditor's daily analysis cannot be used as the measuring stick of the adequacy of the service unless it has been calibrated by actual traffic observations on each line.

TRAFFIC CHECKING METHODS

It is therefore essential that the schedule department should include a permanent traffic checking staff in order that continuous systematic checking be carried on, and in order that the service may be adjusted to the traffic demands. A tentative program has been outlined for checking all lines not less frequently than every thirty days, and particular lines as much oftener as conditions may require. The staff should include at least eight regular checkers. Owing to the limited opportunity to get observations on Saturday and Sunday travel, the checking program should include observations every Saturday and Sunday, allowing checkers a day off in the middle of the week.

The traffic checkers must be accurate in their observations and records, and men with proper qualifications should be selected and trained for this work. Traffic checking is not to be looked upon as a place to use disabled or convalescent trainmen. The records of the traffic checkers form the basis for making schedules, and the need for reliability is beyond argument. New forms have been recommended and are in use for recording and summarizing the traffic data.

The number of cars scheduled for operation by hourly periods during the day on weekdays, Saturdays and Sundays is set forth graphically in an accompanying chart. As will be seen, the morning and afternoon peaks in the week-day schedule are very pronounced, the ratio of cars scheduled in the afternoon peak being 2.3 times the number in service at mid-day, and 3.2 times the number in service at 9 p.m.

The Saturday curve has an entirely different characteristic. The cars in service during the morning peak outnumber those used at any other period. The afternoon 5 p.m. to 6 p.m. peak is much lower than that on weekdays but the number of cars in service at noon is substantially greater than for the corresponding period weekdays. On Sundays, there are no peaks. Approximately the same number of cars is in service from 10 a.m. to 9 p.m.

Planning a Car Repair Shop

A Layout for the Upkeep of 1,000 Cars Which Will Turn Out 2.4 Overhauled Cars and 2.2 Painted Cars a Day—Speed in Repairs and Economy of Man-Power Are the Governing Features

*By Henry S. Day**

Railway Department, Westinghouse Electric & Manufacturing Company

THE car repair shop should be planned to give complete accessibility of equipment, cut down duplicate movements and as far as possible make it practicable progressively to route the work attendent on repairs and overhaul. In the present suggested layout no particular attempt at economy of space or facilities or first cost has been made, the main object sought being plenty of room around cars and trucks, good light, all movement of heavy parts performed with cranes, electric trucks or transfer tables, and all work carried on both by shop and stores department where it cannot be hampered by weather conditions. First costs have been set aside to obtain speed in repairs, short shopping periods and reduction in number of men constituting the shop force.

The principal features of this plan are as follows:

1. Three transfer tables which serve any car in the overhaul section or paint shop and make it possible to move any car without interference of operations or other movements.
2. The grouping of departments to eliminate interference and to reduce to a minimum cross-routing and back-tracking of material and parts.
3. Adequate crane service quickly to move material and parts in process of repair to and from car bodies and trucks undergoing overhaul.
4. A receiving and shipping dock for repair parts for carhouses and other departments incorporated as part of the shop.
5. Ample light, ventilation and space.

This layout is based on a total of 1,000 cars, each averaging 3,000 miles per month or 36,000 miles per year. On the basis of a mileage of 48,000 the overhaul period is sixteen months and with a painting period of eighteen months the shop would have to produce 2.5 cars overhauled per day and 2.2 cars painted per day.

Operating the shop on a 300 working-day year and a twenty-five-day month, a fifteen-day shopping period and an eight-day period for painting would require twenty-two cars in the shop for overhaul and twenty-two cars in the paint shop at all times.

Allowing 10 per cent of the equipment out of service

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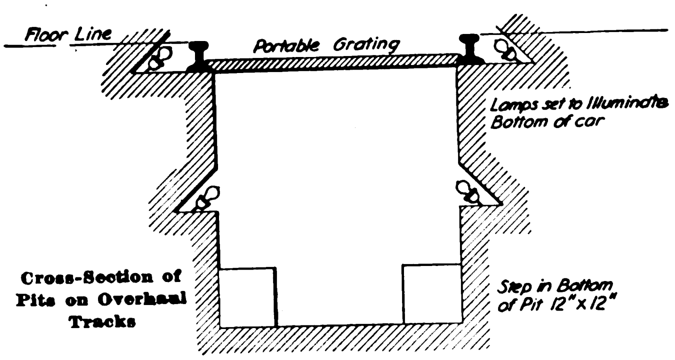
*Formerly superintendent of equipment Kansas City Railways.


Floor Line
Portable Grating
Lamps set to Illuminate Bottom of car
Step in Bottom of Pit 12"x12"

Cross-Section of Pits on Overhaul Tracks

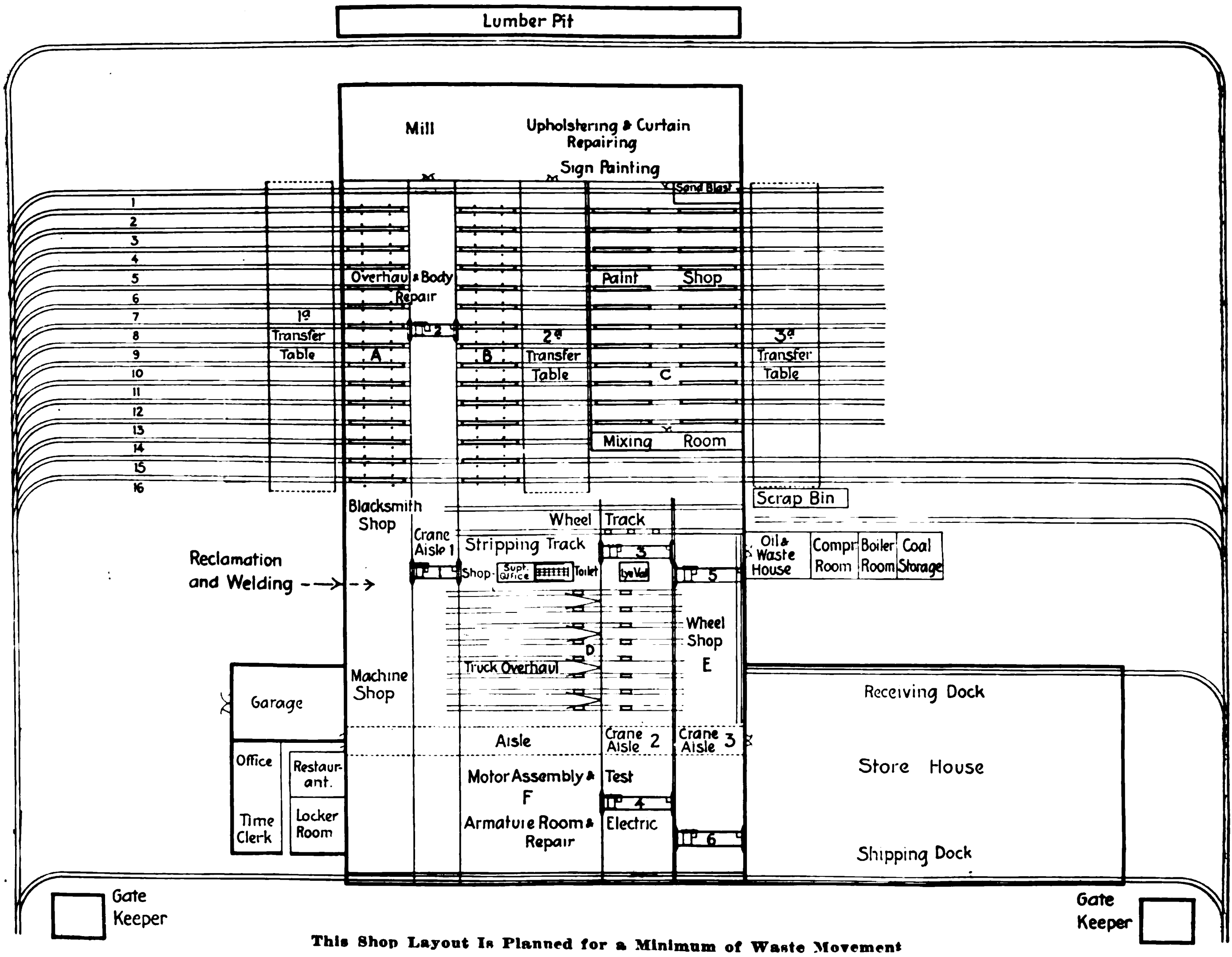
for all causes would give forty-four cars for overhaul and painting and fifty-six cars for wrecks and miscellaneous failures. It is believed that this assumed number of cars and the time required for shopping can be reduced, thereby increasing the capacity of the shop and the number of cars available for service.

In the diagram of the shop layout, it is planned that cars to be overhauled will enter the shop on any tracks from 2 to 14, or on track 1, which is equipped with trolley wire, to transfer table 2*a*. Car spaces on each side of electric crane No. 2 are equipped with stationary air jacks and pits. Unless the car is to be painted it will be completely overhauled in the space originally selected, without further shifting. Trucks will move from under the car on their own power to electric crane aisle No. 1 and by crane to the stripping track. From the stripping track pits crane No. 3 will move the motors to the motor assembly and the wheels to the wheel track back of the stripping track. Truck frames and parts will go into the lye vat and from the lye vat to the truck overhaul tracks. Wheels will be rolled to crane aisle No. 3 through the wheel shop, and after repairs will be dropped by crane No. 5 at the end of the truck overhaul track, where the truck they are intended for is being overhauled. When the truck is completed it will be moved forward to crane aisle No. 1 for delivery back to the car.

Crane aisle No. 1 serves all overhaul cars, blacksmith shop, welding and reclamation, machine shop, armature room and shipping and receiving dock by transfer. No. 2 serves the wheel shop, where all operations on wheels will be carried on, and the receiving and shipping dock by transfer. No. 3 serves the truck overhaul, motor assembly armature room, and end of receiving and shipping dock.

Cross-movements, as from storeroom to machine shop, or armature room to machine shop, will be made by electric lift trucks, as will material moved to and from mill and paint shop. Cars overhauled in overhaul section *A* and not intended for the paint shop would move out of the shop when completed to transfer table No. 1*a* and cars from overhaul section *B* over transfer table No. 2*a* and out of the shop over tracks 15 or 16.

Trolley wire is extended above overhaul sections *A* and *B* and in the paint shop, but not over crane aisle No. 1 except on track 1. Tracks would be laid from transfer table No. 1*a* to No. 3*a*, as the transfer tables


Lumber Pit
Mill
Upholstering & Curtain Repairing
Sign Painting
Sand Blast
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
1a Transfer Table
Overhaul & Body Repair
A
B
2a Transfer Table
Paint Shop
C
Mixing Room
3a Transfer Table
Scrap Bin
Blacksmith Shop
Crane Aisle 1
Wheel Track
Stripping Track
Reclamation and Welding
Shop
Supt. Office
Toilet
Lye Vat
Oil & Waste House
Compr. Room
Boiler Room
Coal Storage
D
Truck Overhaul
Wheel Shop
E
Machine Shop
Garage
Aisle
Crane Aisle 2
Crane Aisle 3
Receiving Dock
Store House
Shipping Dock
Office
Time Clerk
Restaurant
Locker Room
Motor Assembly & F
Armature Room & Repair
Test
Electric
Gate Keeper
Gate Keeper

This Shop Layout Is Planned for a Minimum of Waste Movement

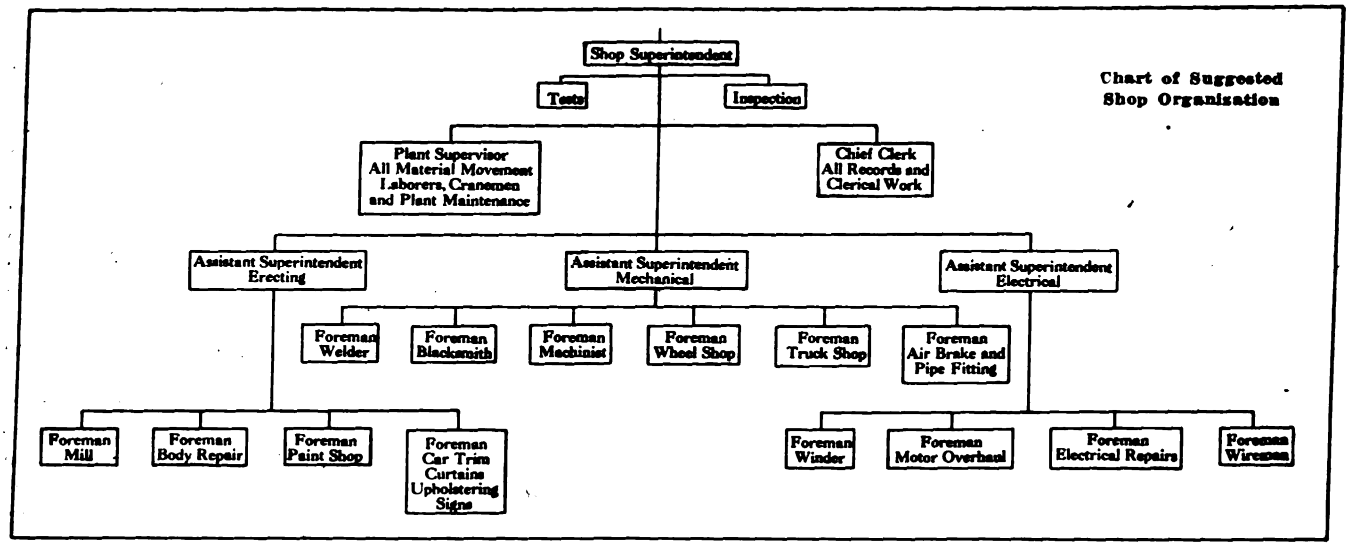

Shop Superintendent
Tests
Inspection
Plant Supervisor All Material Movement Laborers, Cranemen and Plant Maintenance
Chief Clerk All Records and Clerical Work
Assistant Superintendent Erecting
Assistant Superintendent Mechanical
Assistant Superintendent Electrical
Foreman Welder
Foreman Blacksmith
Foreman Machinist
Foreman Wheel Shop
Foreman Truck Shop
Foreman Air Brake and Pipe Fitting
Foreman Mill
Foreman Body Repair
Foreman Paint Shop
Foreman Car Trim Curtains Upholstering Signs
Foreman Winder
Foreman Motor Overhaul
Foreman Electrical Repairs
Foreman Wiremen

Chart of Suggested Shop Organization

would be of the surface type without pit. With trolley wire extending from overhaul section *B* over the transfer table and through the paint shop, cars can move on their own power from section *B* out. Tracks 2 to 14 in section *B* and 2 to 10 in section *A* would usually be reserved for straight overhaul, leaving tracks 11 to 14 in section *A* for wrecks and emergency body repairs, with tracks 15 and 16 in sections *A* and *B* held for hurry-up work on cars sent in for wheel and motor changes.

All tracks in sections *A* and *B* would have pits covered by portable gratings as shown in the accompanying diagram, to act as a floor when the car was on jacks or blocked up, and to be removed when the car was down on the trucks for final connections and inspection. Dummy trucks would not be necessary as the car would leave the location in which it was overhauled on its own completed trucks, which would be painted in the truck overhaul section. If the car was scheduled for the paint shop it would move in on its own trucks and not again be jacked. The objection of painting trucks in the center of the shop would be overcome by spray painting under a portable hood handled by crane No. 1 and connected to an exhaust duct in the floor.

The lighting scheme in the pits is arranged to floodlight the bottom of the car in each position and would do away to a large extent with the use of extension lamps.

This idea is also carried out in the truck overhaul pits, as shown in the accompanying illustration. These are also arranged so that by the removal of the gratings three standing levels are provided. This will afford greater ease to the truck repair men and consequently get more accuracy and speed. Electric tier lift trucks with projecting beds would be used to move brake cylinders, compressors, grid frames, controllers, etc., from the crane way to the exact location on the car body and would also be used to raise apparatus into position for hanger bolts without additional handling.

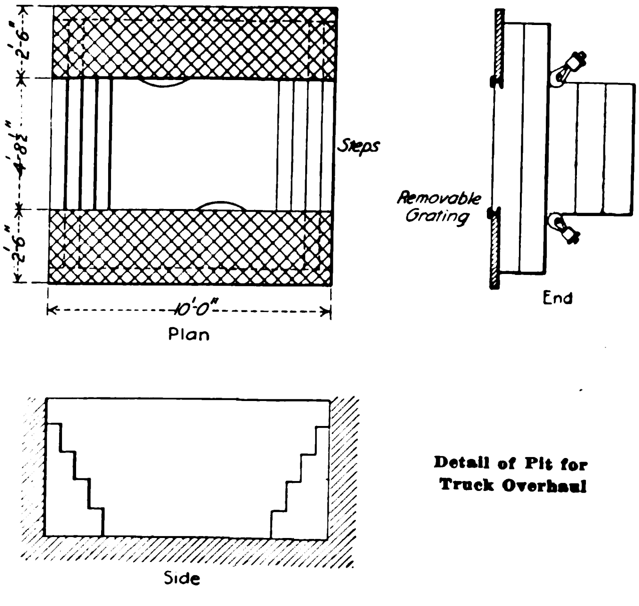
The entire shop would be floodlighted with the addition of individual lighting on all machine tools. Natural light would be from all available space for sash in all walls and swivel sash in the sawtooth roof.

A suggested organization is shown in the diagram. This differs from the average car-shop organization in that the departments are made up in three groups, each section of each group handling classes of work that are closely parallel. Each of these three groups is under an assistant shop superintendent who is a specialist in at least one of the classes of work under him, and who has had close associations with the other classes of work in his own group.

These three assistant superintendents would be individually a car builder, a machinist and an armature winder. They should be capable of using the right judgment and supervision over other classes of work very closely allied. This would eliminate a condition which often exists, of a machinist passing judgment on a paint job, which often happens when a machinist becomes a machine shop foreman and finally a general foreman.

With the suggested arrangement the three assistant shop superintendents carry on and are wholly responsible for the production. They report to a higher man who is primarily an executive, who controls the administration and keeps the production force supplied with cars, material and men, and the plant at all times in proper operating condition to perform the work.

Probably one of the first criticisms of this organization will be that it is too expensive and not necessary, but there is no better investment than plenty of the right kind of supervision. Manufacturers learned long ago that well-trained, well-paid specialized supervision was a requisite for successful manufacturing; and this is a parallel that can be drawn by the electric railway operator with sure results.


2'-6"
4'-8½"
2'-6"
Steps
10'-0"
Plan
Removable Grating
End
Side

Detail of Pit for Truck Overhaul

Machine Sorts Receipts from Locked Fare Boxes

Machine Designed and Built by Kansas City Railways Handles Cash, Tickets and Tokens in Denominations Up to Half Dollars

By R. S. NEAL
Assistant Superintendent of Equipment Kansas City Railways

THE problem of counting the day's receipts, which became acute when the Kansas City Railways adopted locked fare boxes to receive cash fares, tokens and paper tickets, was facilitated greatly by the use of a machine for separating the various classes of coins and the paper tickets. When the system was changed, the total receipts for the day were put into the money counting room the morning after their receipt, instead of being handled on the same day, as heretofore.

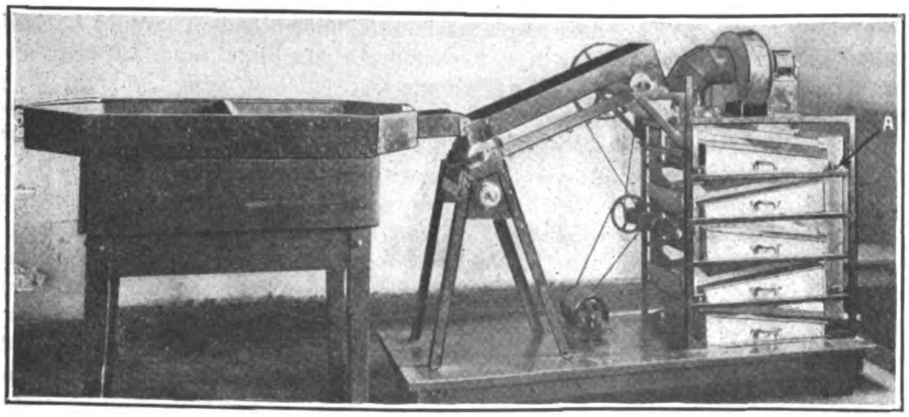
The fare box used is of the non-registering type and a separate check is not made of the individual conductor. The returns are considered as the receipts of the line or division from which they are collected. The magazine is removed from the fare box on the car at the end of each day and sent to the money room during the night or early the next day. There is a very large proportion of tickets and tokens. On account of this, it was necessary to design a machine that could handle the tickets and tokens, as well as the money.

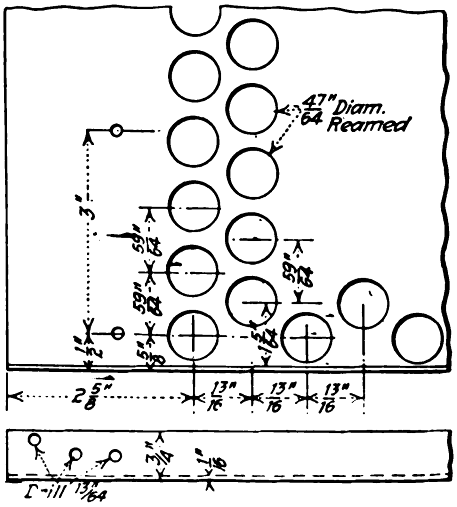
A separating machine had been in use for several years, but it was not satisfactory. It had been necessary to change the design several times and also to run the machine much faster than the original plans called for in order to handle all the receipts in the required time.

A complete study was made of the amount of money handled and a new machine was designed embracing quite a number of ideas that had not been used previously. For instance, special ball bearings were used on the traveling trays, which we knew would give absolute satisfaction. It was also decided that, on account of the high speed of the machine, with trays which have a reciprocating motion, it would be absolutely necessary to make this machine of the lightest possible material, taking into consideration that it also must have strength to withstand the severe service that would be given it each day.

The receipts, consisting of tickets, tokens and coins, are emptied into a large trough at the end of the separating machine. They are passed along on the traveling belt, which carries them up to the machine proper, dropping them into a small tray immediately under the pipe elbow. At this point, the air suction created by a fan connected to this pipe elbow picks up the paper tickets, but not any of the coins or tokens, carrying them through the fan into a receptacle not shown in this picture. This receptacle is cylindrical and its sides are perforated, which allows the air to escape while retaining the tickets. The coins fall through to the first tray, part of them dropping further into the pan underneath, and the remainder traveling across the tray to the end where they drop down to the next tray. The pan is stationary, and is supported by the frame of the machine.

The trays have a reciprocating motion, traveling on small ball bearings. One of these is marked with the letter *A* on the photograph. There are four of these bearings which support each tray frame. These trays are perforated suitably for the different sized coins. The whole lot of coins travel across the tray, part of them falling through and the remainder dropping at the end to the next tray. In that way there is a gradual separation of all the money that was started at the top. The money moves in a zigzag fashion from one side of the machine to the other as it travels down.





This Machine Sorts 180,000 Coins and 20,000 Paper Tickets an Hour. At the Right, Part of the Aluminum Tray for Separating Dimes

A portion of one of these trays, the one for handling dimes, is shown in the diagram. This tray is made of hard drawn aluminum, with holes of exact size to allow coins of the desired denomination to drop through, while larger ones must travel across the tray. The tray is 11½ in. wide and 23⅜ in. long.

The stationary pans into which the tokens or coins drop are removable. They usually are removed after each batch of money is put through the machine, and are emptied into the machines for wrapping and counting the coins.

The machine itself is driven by one ½-hp. shunt-wound motor, and the fan which picks up the tickets is driven by a $\frac{1}{20}$-hp. shunt-wound motor.

In order to be absolutely protected two of these machines were put through the shop at the same time. The complete cost of these machines, including the motors and all material. was approximately $700.

In actual work, this machine handles in two and one-quarter hours 45,000 tickets, 275,000 tokens, 11,000 dimes, 90,000 pennies, 26,000 nickels, about seventy-five quarters and very few half dollars. It can be readily seen that a great saving is made in labor by the use of this machine.

Electric Railway Passengers Increased 12 per Cent in Five Years

Preliminary Census Figures Compare 1922 with 1917—More Complete Statistics for Eight States Show a General Gain in Revenue, Although Track Mileage Decreased in Places

THE generally healthy condition of the electric railway industry throughout the United States is shown by the preliminary census figures recently announced by the Department of Commerce. Revenue passengers carried during the year 1922 numbered 12,665,300,050, as compared with 11,304,650,462 in 1917, when the last similar survey was made. This is an increase of 12 per cent for the five-year period, and an increase of 32.7 per cent compared with 1912, when the number was 9,545,554,667.

The total electric railway mileage in the country, however, as reported to the Census Bureau, has been somewhat reduced during the last five years. The survey shows that the miles of single track operated in 1922 aggregated 43,934 as compared with 44,808 miles in 1917, a decrease of 2 per cent. When the latter figure is compared with that for 1912, however, an increase of 7.1 per cent for the ten-year period is found. The largest recent trackage losses have occurred in Massachusetts and Ohio. In Massachusetts there was also a reduction in the number of passengers carried, but in Ohio the number increased more than 60,000,000 in spite of the smaller track mileage.

	Revenue Passengers		Miles of Single Track Operated	
	1922	1917	1922	1917
United States	*12,665,300,050	11,304,660,462	43,933.88	44,808.31
New York	3,087,744,368	2,492,325,233	4,792.35	4,773.36
Pennsylvania	1,415,924,112	1,300,087,044	4,423.08	4,462.11
Illinois	1,128,105,714	1,096,803,684	3,414.15	3,441.43
Ohio	872,974,191	811,912,634	3,975.84	4,236.11
California	755,126,337	494,165,724	3,075.75	3,022.08
Massachusetts	732,447,691	834,538,961	2,689.57	3,055.88
Michigan	557,899,672	447,780,173	1,813.94	1,768.37
New Jersey	466,818,827	432,874,767	1,342.93	1,368.06
Missouri	464,602,457	442,755,505	1,038.23	1,093.65
Minnesota	262,782,125	235,943,196	680.89	655.90
Maryland	248,593,711	228,633,563	758.38	774.62
Indiana	241,872,670	191,132,390	2,309.33	2,355.58
Texas	188,555,977	150,400,787	973.69	949.94
Connecticut	185,039,310	206,739,956	1,010.86	1,079.72
Wisconsin	181,374,525	164,995,818	919.44	901.28
District of Columbia	156,242,945	125,535,527	198.54	194.87
Washington	143,428,511	145,922,160	953.57	1,021.69
Rhode Island	143,008,903	113,191,055	402.54	453.61
Louisiana	128,336,883	105,753,068	304.80	330.59
Virginia	116,289,084	112,813,983	553.67	580.68
Kentucky	115,593,599	109,105,583	513.05	515.70
Tennessee	110,369,343	101,824,749	494.53	447.36
Georgia	105,957,665	93,640,506	450.60	449.69
Iowa	95,493,755	103,898,186	1,001.31	1,015.45
West Virginia	91,079,124	76,162,837	422.06	395.15
Colorado	81,613,515	84,623,896	430.81	467.15
Nebraska	76,845,760	74,560,104	206.05	210.99
Alabama	73,520,131	70,343,556	364.50	369.35
Oregon	71,803,754	67,222,935	612.01	603.13
Maine	50,010,345	55,463,285	566.08	571.52
Florida	41,316,572	32,771,128	197.04	83.03
Kansas	37,871,575	40,456,149	581.20	581.69
Oklahoma	35,402,037	30,766,522	323.81	301.51
Utah	33,622,564	40,890,741	477.60	469.40
Arkansas	29,954,017	26,283,177	120.32	121.83
North Carolina	29,619,319	26,915,221	215.55	227.63
Delaware	20,860,564	26,046,911	105.87	101.95
South Carolina	20,211,444	25,042,140	301.40	313.56
New Hampshire	19,650,000	23,405,151	263.46	269.34
Montana	15,254,913	22,196,885	111.26	120.92
Mississippi	8,412,372	10,730,801	97.91	124.17
Vermont	6,949,976	8,738,378	116.11	125.55
Arizona	5,473,890	7,482,895	44.12	52.89
North Dakota	3,378,686	2,840,840	20.66	24.42
Idaho	3,255,578	3,278,906	149.46	155.40
South Dakota	2,022,714	1,914,947	17.20	24.44
New Mexico	1,424,861	1,486,434	11.00	10.95
Wyoming	683,964	1,457,508	22.84	23.05
Nevada	480,000	804,863	4.52	1.56

* Includes 11,852,726 bus passengers carried by motor buses operated as parts of electric railway systems.

In most states where the trackage is less, there has been a change in operating methods, with consequent elimination of duplicate mileage, rather than suspension of service. This is shown by the fact that the largest falling off in trackage occurred in those states where the electric railway has been most highly developed, such as Pennsylvania, Ohio, Illinois, Massachusetts, Indiana, New Jersey, etc., whereas most of these states showed a decided increase in the number of revenue passengers carried.

Besides the encouraging aspect of the situation illustrated by the increase in traffic, there is also the fact that the railways in general had the advantage in 1922 of higher rates than they had in 1912, and this has further augmented their revenue. In spite of higher costs and higher taxes, the net income after all deductions has in many cases been more than 100 per cent greater in 1922 than it was five years before. These facts, therefore, point to the conclusion that the electric railway industry in the United States is today in a firmer position than ever before. More detailed figures for the individual states released follow:

South Carolina.—The figures show a slight decrease in track mileage, which was accompanied by a decrease of 21.4 per cent in the number of passengers carried. However, on account of fare increases, gross railway operating revenues increased 21.5 per cent, aggregating $3,368,058 in 1922 as compared with $2,772,841 in 1917, but owing to a more rapid increase in expenses net income decreased from $563,791 in 1917 to only $2,009 in 1922.

	1922	1917	Per Cent of Increase 1917-1922
Number of operating companies	†6	7	......
Miles of single track‡	332.12	335.73	*1.1
Number of cars, all types	395	458	*13.8
Electric locomotives	16	12	......
Number of persons employed	1,298	1,499	*13.4
Salaries and wages	$1,497,988	$976,090	53.5
Primary horsepower, total	19,600	36,600	*46.4
Kilowatt capacity of generators	12,000	25,750	*53.4
Current generated, kilowatt-hours	35,895,050	40,878,930	*12.2
Current purchased, kilowatt-hours	30,011,513	62,985,134	*52.4
Passengers carried	22,338,616	28,408,318	*21.4
Revenue car mileage	7,718,687	8,235,764	*6.3
Railway operations, revenues	$3,368,658	$2,772,841	21.5
Railway operations, expenses	$2,721,956	$1,729,594	57.4
Net revenues, railway operations	$646,702	$1,043,247	*38.0
Auxiliary operations, revenues**	$637,628	$993,792	*35.8
Auxiliary operations, expenses	$290,160	$556,906	*47.9
Net revenues, auxiliary operations	$347,468	$436,886	*20.5
Net operating revenues	$994,170	$1,480,133	*32.8
Taxes assignable to railway operations	$227,652	$187,055	21.7
Operating income	$766,518	$1,293,078	*40.7
Non-operating income	$150,329	$137,838	9.1
Gross income	$916,847	$1,430,916	*35.9
Interest and other deductions from gross income	$914,838	$867,125	5.5
Net income	$2,009	$563,791	*99.6

*Indicates decrease.

†One company with 3 miles of track discontinued operations prior to 1922.

‡Includes 55.82 miles in 1922 and 53.91 miles in 1917 lying outside of the state but owned by companies within the state, and excludes 25.10 miles in 1922 and 31.74 miles in 1917 operated in the state but owned by companies outside of the state.

**Chiefly revenue from electric light and power departments of electric railways.

Florida.—The figures show an increase of 7.7 per cent in track mileage, and a gain in the number of passengers carried of 27.4 per cent. Gross railway operating revenues amounted to $2,466,367 in 1922, an increase of 46.5 per cent as compared with 1917, operating expenses increased 62.9 per cent, and net income from all sources made a gain of 102.1 per cent.

	1922	1917	Per Cent of Increase 1917–1922
Number of operating companies.......	†7	8	......
Miles of single track................	197.04	183.03	7.7
Number of cars, all types............	415	333	24.6
Number of persons employed.........	1,166	1,029	13.3
Salaries and wages..................	$1,513,284	$886,192	70.8
Primary horsepower, total............	32,849	33,905	*3.1
Kilowatt capacity of generators.......	22,645	24,300	*6.8
Current generated, kilowatt-hours.....	44,931,299	31,101,546	44.5
Current purchased, kilowatt-hours.....	4,042,400	971,610	316.1
Passengers carried..................	49,220,967	38,625,356	27.4
Revenue car mileage................	9,057,700	7,208,883	25.6
Railway operations, revenues.........	$2,466,367	$1,683,350	46.5
Railway operations, expenses.........	$1,743,830	$1,070,254	62.9
Net revenues, railway operations......	$722,537	$613,096	17.9
Auxiliary operations, revenues‡.......	$1,611,372	$759,604	112.1
Auxiliary operations, expenses.........	$638,813	$316,853	101.6
Net revenues, auxiliary operations.....	$972,559	$442,751	119.7
Net operating revenues..............	$1,695,096	$1,055,847	60.5
Taxes assignable to railway operations.	$326,502	$157,561	107.2
Operating income...................	$1,368,594	$898,286	52.4
Non-operating income...............	$19,526	$1,560	1,151.7
Gross income......................	$1,388,120	$899,846	54.3
Interest and other deductions from gross income........................	$295,171	$358,995	*17.8
Net income........................	$1,092,949	$540,851	102.1

†One company with 4.04 miles of track discontinued operations prior to 1922.
‡Chiefly revenue from electric light and power departments of electric railways.

New Hampshire.—An increase of 6.2 per cent in track mileage was accompanied by a decrease of 15.5 per cent in passengers carried. However, owing to fare increases, operating revenues increased from $1,250,769 in 1917 to $1,666,029 in 1922, a gain of 33.2 per cent, and net income from all sources increased 28.7 per cent.

	1922	1917	Per Cent of Increase 1917–1922
Number of operating companies.......	14	13	......
Miles of single track†...............	216.03	203.37	6.2
Number of cars, all types............	346	307	12.7
Electric locomotives................	1	2	......
Number of persons employed.........	586	609	*3.8
Salaries and wages..................	$808,136	$481,000	68.0
Primary horsepower, total............	2,250	3,982	*43.5
Kilowatt capacity of generators.......	1,250	2,675	*53.3
Current generated, kilowatt-hours.....	4,369,770	5,491,065	*20.4
Current purchased, kilowatt-hours.....	13,298,632	11,006,954	20.8
Passengers carried..................	22,270,122	26,341,020	*15.5
Revenue car mileage................	4,005,831	3,890,158	3.0
Railway operations, revenues.........	$1,666,029	$1,250,769	33.2
Railway operations, expenses.........	$1,431,219	$999,087	43.3
Net operating revenues..............	$234,810	$251,682	*6.7
Taxes assignable to operations........	$91,019	$67,404	35.0
Operating income...................	$143,791	$184,278	*22.0
Non-operating income...............	$23,887	$6,909	245.7
Gross income......................	$167,678	$191,187	*12.3
Deductions from gross income........	$78,638	$122,011	*35.5
Net income........................	$89,040	$69,176	28.7

†Excludes 47.43 miles of track in 1922 and 65.97 miles in 1917 operated in the state but owned by companies outside of the state.

Kentucky.—There was a small increase in track mileage, and a gain of 4.4 per cent in the number of passengers carried. Gross railway operating revenues amounted to $8,027,986 in 1922, an increase of 27 per cent as compared with 1917, but on account of the more rapid increase in expenses both net revenue from railway operations and net revenue from all sources decreased by slightly over 13 per cent.

	1922	1917	Per Cent of Increase 1917–1922
Number of operating companies.......	9	11	......
Miles of single track†...............	499.52	498.23	0.3
Number of cars, all types............	992	1,059	*6.3
Number of persons employed.........	2,645	2,857	*7.4
Salaries and wages..................	$3,358,411	$2,233,878	50.3
Primary horsepower, total............	44,550	41,710	6.8
Kilowatt capacity of generators.......	29,500	30,625	*3.7
Current generated, kilowatt-hours.....	52,192,809	71,257,192	*26.8
Current purchased, kilowatt-hours.....	28,784,647	30,516,586	*5.7
Passengers carried..................	147,490,154	141,218,932	4.4
Revenue car mileage................	20,371,699	22,865,008	*10.9
Railway operations, revenues.........	$8,027,986	$6,319,418	27.0
Railway operations, expenses.........	$5,840,500	$3,789,486	54.1
Net operating revenues..............	$2,187,486	$2,529,932	*13.5
Taxes assignable to railway operations.	$567,115	$517,515	9.6
Operating income...................	$1,620,371	$2,012,417	*19.5
Non-operating income...............	$234,704	$149,555	56.9
Gross income......................	$1,855,075	$2,161,972	*14.2
Deductions from gross income........	$1,202,920	$1,410,815	*14.7
Net income........................	$652,155	$751,157	*13.2

†Includes 1.07 miles in 1922 lying outside of state, but owned by companies within the state, and excludes 22.74 miles in 1922 and 17.47 in 1917 operated in the state, but owned by companies outside of the state.

Tennessee.—Track mileage increased 9.1 per cent and there was a gain of 6.6 per cent in the number of passengers carried. Gross railway operating revenues amounted to $8,011,437 in 1922, an increase of 48.7 per cent as compared with 1917, and net income from all sources increased 101.8 per cent during the five-year period.

	1922	1917	Per Cent of Increase 1917–1922
Number of operating companies.......	13	14	......
Miles of single track†...............	503.89	462.00	9.1
Number of cars, all types............	844	840	0.5
Electric locomotives................	3	1	......
Number of persons employed.........	2,841	2,963	*4.1
Salaries and wages..................	$3,654,950	$2,238,014	63.3
Primary horsepower, total............	35,200	53,533	*34.2
Kilowatt capacity of generators.......	25,450	38,205	*33.4
Current generated, kilowatt-hours.....	29,398,550	90,682,359	*67.6
Current purchased, kilowatt-hours.....	103,314,847	79,354,017	30.2
Passengers carried..................	130,767,681	122,655,470	6.6
Revenue car mileage................	19,121,967	21,400,684	*10.6
Railway operations, revenues.........	$8,011,437	$5,386,465	48.7
Railway operations, expenses.........	$5,376,897	$3,694,943	45.5
Net revenues, railway operations......	$2,634,540	$1,691,522	55.7
Auxiliary operations, revenues‡.......	$1,832,280	$2,132,199	*14.1
Auxiliary operations, expenses.........	$846,306	$899,831	*5.9
Net revenues, auxiliary operations.....	$985,974	$1,232,368	*20.0
Net operating revenues..............	$3,620,514	$2,923,890	23.8
Taxes assignable to railway operations.	$944,376	$593,513	59.1
Operating income...................	$2,676,138	$2,330,377	14.8
Non-operating income...............	$143,537	$36,333	295.1
Gross income......................	$2,819,675	$2,366,710	19.1
Interest and other deductions from gross income........................	$1,561,212	$1,743,020	*10.4
Net income........................	$1,258,463	$623,690	101.8

†Includes 9.36 miles in 1922 and 14.64 miles in 1917 lying outside of the state but owned by companies within the state. Also includes in 1922, 46.70 miles of track (not equipped with electric power) over which gasoline motor cars are operated.
‡Chiefly revenue from electric light and power departments of electric railways.

Montana.—Gross railway operating revenues amounted to $969,213 in 1922 as compared with $1,178,755 in 1917, a decrease of 17.8 per cent, while the net income from all sources decreased 76.3 per cent. Track mileage shows a decline of 8 per cent, and passenger traffic decreased 32.5 per cent.

	1922	1917	Per Cent of Increase 1917–1922
Number of operating companies.......	†5	6	......
Miles of single track................	111.27	120.92	*8.0
Number of cars, all types............	173	184	*6.0
Number of persons employed.........	334	486	*31.3
Salaries and wages..................	$556,106	$572,604	*2.9
Current purchased, kilowatt-hours.....	18,304,263	17,927,151	2.1
Passengers carried..................	17,522,464	25,948,387	*32.5
Revenue car mileage................	2,979,323	3,591,815	*17.1
Railway operations, revenues.........	$969,213	$1,178,755	*17.8
Railway operations, expenses.........	$895,625	$961,128	*6.8
Net revenues, railway operations......	$73,588	$217,627	*66.2
Auxiliary operations, revenues‡.......	$354,106	$322,628	9.8
Auxiliary operations, expenses.........	$171,984	$150,283	14.4
Net revenues, auxiliary operations.....	$182,122	$172,345	5.7
Net operating revenues..............	$255,710	$389,972	*34.4
Taxes assignable to railway operations.	$96,386	$77,124	25.0
Operating income...................	$159,324	$312,848	*49.1
Non-operating income...............	$2,797	$18,500	*84.9
Gross income......................	$162,121	$331,348	*51.1
Deductions from gross income........	$116,373	$138,681	*16.1
Net income........................	$45,748	$192,667	*76.3

†One company with 6.4 miles of track which reported in 1917 discontinued operations prior to 1922.
‡Chiefly revenues from electric light and power departments of electric railways.

Nevada and Utah.—The track mileage operated in these states in 1922 was practically the same as in 1917, but the number of passengers carried decreased 18.1 per cent. However, on account of fare increases, gross railway operating revenues made a gain of 26.8 per cent, aggregating $4,334,800 in 1922, while railway operating expenses increased 30 per cent.

	1922	1917	Per Cent of Increase 1917–1922
Number of operating companies.......	6	6	......
Miles of single track†...............	488.93	488.97	......
Number of cars, all types............	722	518	39.4
Number of persons employed.........	1,130	1,552	*27.2
Salaries and wages..................	$1,700,174	$1,389,553	22.4
Current purchased, kilowatt-hours.....	42,588,598	40,349,995	5.5
Passengers carried..................	39,790,937	48,561,651	*18.1
Revenue car mileage................	9,972,268	9,970,594	......
Railway operations, revenues.........	$4,334,800	$3,418,967	26.8
Railway operations, expenses.........	$2,783,446	$2,141,169	30.0
Net operating revenues..............	$1,551,354	$1,277,798	21.4
Taxes assignable to railway operations.	$322,609	$220,703	4.62
Operating income...................	$1,228,745	$1,057,095	16.2
Non-operating income...............	$428,342	$377,486	13.5
Gross income......................	$1,657,087	$1,434,581	15.5
Deductions from gross income........	$1,638,498	$1,466,913	11.7
Net income........................	$18,589	‡$32,332	......

†Includes 6.81 miles in 1922 and 8.01 miles in 1917 operated outside of the state, but owned by companies within the state.
‡Deficit.

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*Indicates decrease.

The Readers' Forum

The Weekly Pass as a Simple Zoning Expedient

UNITED RAILWAYS OF ST. LOUIS, MO.
Oct. 16, 1923.

To the Editors:

Almost any street railway man will admit that the distance fare is right in principle, that it is more equitable between different passengers than the flat fare, and that from the company's standpoint it has the advantages of getting more revenue from the long-haul passenger without driving him away and of putting the cars in a better position to compete with the sidewalks and jitneys for the short-distance business. With all these advantages, however, distance or zone fares have been adopted in very few cities. Managements have hesitated to urge them on account of the difficulties introduced in fare collection. Doubtless, too, they would meet with opposition from a considerable part of the public.

The distance fare principle can, however, be introduced to a large degree without increasing fare collection troubles, and probably without marked public opposition, by means of the weekly pass. The method is applicable to any surface system on which fare collection is entirely pay-as-you-enter or entirely pay-as-you-leave and to any rapid transit system which collects its fares at the entrance to the stations. It is simply to divide the single fare area, which will remain a single fare area so far as cash and ticket fares are concerned, into pass sections, and issue a distinct pass for each section, good for transportation if presented within that section. Then the holder of a section pass could ride at will within the limits of the section designated. If he made a trip between a point within the zone and one without, he could use the pass only one way, and on the opposing trip would be obliged to pay the full cash or ticket fare, unless he also possessed a pass good in the section at the other end of the trip. If he had a pass good anywhere on the system he would not of course have any zone passes, and if such general passes were available there would be no point in his having two section passes, since the price of the latter would presumably be at least half of that of the former.

The section pass would then be a short-haul pass so far as its own section was concerned. On long trips it could be used only one way, and in consequence could be used only half as often as a pass of general acceptability. In view of these facts it could be sold at a less price than that required for the general pass, and so would help the company to get the short-haul business in spite of a high cash fare and a high-priced general pass.

In a circular city with its business district in the center, it might be well to have five primary sections, as follows: Central, northern, eastern, southern, western. The boundary between the central and other sections would be perhaps half way between the business center and the fare limits. Overlapping sections might be provided to care for short rides between points in adjacent primary sections. Or the primary sections might be made to overlap. The number of sections, overlapping or not, which can be provided is limited only by the possibility of printing the respective passes so that the conductors can readily distinguish them.

The plan here outlined is particularly applicable to systems in cities of large area, where the average haul is long, where the fare is consequently so high as to discourage short-haul riding or drive it to competitors and where a low-priced general pass would cut too deeply into the revenue derived from the long-haul business. In cities where these general conditions do not obtain, it may be found useful under some peculiar conditions.

This plan is believed to be original with the writer. Steady reading of the ELECTRIC RAILWAY JOURNAL has failed to bring to his attention any such suggestion. It is offered to the industry in the hope that it will prove useful in solving some of the many problems with which urban railways are confronted.

LAWRENCE H. DOOLITTLE.

Is the Electric Railway Industry Tottering?

NEW YORK, Oct. 29, 1923.

To the Editors:

Within the last five years, according to the Census Bureau, there has been a net loss of nearly 900 miles of electric railway track, or about 2 per cent. Is the electric railway industry tottering?

No. This is not a sign of tottering. Every industry gets overbuilt at times, and of course there has been much track that ought never to have been built.

Other statistics recently published by the Census Bureau show that between 1917 and 1922 there was a loss of traffic by electric railways in nineteen states of the Union. Is this an indication of tottering?

No. It will take more than this to make the industry totter. These passengers have largely deserted temporarily for an extravagant means of transport, namely, private automobile. This tendency is bound to have limits and is bound to correct itself to some extent.

Out of 850-odd electric railways in the United States and Canada only seventeen competed this year for the Coffin Award. Is this significant?

Yes. The industry is certainly dead from its ears up. Here is a practical proposition devised by the most enlightened and practical men in the industry. To qualify, it requires nothing but every-day good management. Or, rather, there is nothing required which should not be done by every management every year to improve its property, yet only seventeen tried. Have the other 833-odd "lain down," or have they failed in all their endeavors to make improvements, or are some of them too modest or lazy to compete? It may be that many have perfect properties and hence have no chance for improvement. It may be that many are too poor. It may be that many were really too busy to prepare elaborate briefs.

Is it too much to expect that every electric railway should go after this award? There is not a motion required that a good manager should not make and that will not show favorably in the income account. It is not necessary to expend capital. The award is made for human effort. The small roads need not be backward, for, like the parable, the man with two talents will not be scorned. What is wanted is good, active thinking, and good thinking action. When the industry gets such stuff, it will not totter. It may have to take some hard cracks, but it will take them standing up.

A FRIEND OF THE INDUSTRY.

Association News & Discussions

Report of A.E.R.A. Committee on Valuation

Weight to Be Given Various Evidences of Value and Study of Present Price Trends Are Principal Aspects Considered—Committee Presents Bases for Determining "Present Value"—Report Is Printed in Full as Adopted by Atlantic City Convention

IN 1915 the committee on valuation presented a report on the general problem of valuation. In 1916 the committee presented a bibliography of valuation literature complete to Jan. 1, 1916, and a code of definitions of terms used in valuation work. For the years 1917-1918-1919 the committee reported that in its judgment fair value should include original cost, appreciation and going concern value, and that in those cases where original cost was not available reproduction cost new with proper overheads should be used as a basis, to which should be added going concern value and development cost. The committee also recommended that when a property was in good operating condition and properly maintained no deduction should be made for accrued depreciation in determining rate-making value.

In 1920 the report of the committee further developed the subjects of "cost of reproduction new" and "going value." The 1921 report discussed the rate of return and the importance of placing this rate high enough to attract new capital. The use of the yard stick method in appraisals was advised. Last year the committee further discussed and commended the use of the yardstick method.

For the current year the committee has devoted itself to a study of the weight which should be given to the various evidences of value and to a study of the present price trends. The report in full follows. The conclusions and recommendations are here summarized:

CONCLUSIONS

1. Courts of last resort have up to this time uniformly held that the basis of rate making is the present value of the property, that the ascertainment of that value is not controlled by artificial rules, is not a matter of formulas, but that there must be a reasonable judgment having its basis in a proper consideration of all relevant facts, and, in recent cases, that in the determination of present value the enhanced prices of labor and materials cannot be ignored, and further that present value is not necessarily either "prudent investment," "original cost" or reproduction cost at abnormal prices.

2. That trend prices *based on pre-war price investments* cannot be determined with sufficient accuracy to be used as the basis of valuation.

3. That a careful study of present economic conditions and the underlying causes of variations in the purchasing power of money do not indicate any early return to pre-war price levels, but rather a continuance of present prices with minor fluctuations and possibly a slow decline until the curve of general commodity prices again approximates closely its general trend as established in the period from 1899 to 1915, inclusive, and that, in particular, the conditions governing electric railway construction costs indicate that the curve which represents them will not for ten or fifteen years approximate the trend curve determined by the pre-war period, or, in other words, that construction costs for the next decade at least will remain well above rather than below 150 per cent of corresponding costs in 1913-1914.

RECOMMENDATIONS

1. Our member companies, in approaching the question of valuation before a commission or other regulatory body or before a court, should submit full evidence at least as to original cost, present-day reproduction cost, present and probable future trend of unit costs and direct testimony as to present-day fair value. They should endeavor to reach with the regulatory body a fair, equitable conclusion as to a reasonably stable level of unit costs and an equitable working figure as to such unit costs, if any, as may be admittably still unstable.

2. In the case of properties in serviceable condition and adapted to their purpose, our member companies, in view of controlling court decisions, should take a firm stand for a present plant value approximately equal to reproduction cost at stable unit prices as above and for a fair return upon that value, to which there should of course be added going concern value and other non-physical elements.

WEIGHT TO BE ATTACHED TO VARIOUS EVIDENCES OF VALUE

The Supreme Court of the United States in the leading case of Smyth vs. Ames established the principle that a public utility is entitled to receive from the public a fair return upon the fair value of its property and, the court, though it did not establish any definite rule for the determination of fair value, listed certain evidences of value which in its opinion should, with others, be considered and weighed before fair value can be determined.

The most important evidences of value are:

First—Original cost of construction plus subsequent net capital expenditures.

Second—Amount and market value of stocks and bonds.

Third—Present as compared with original cost of construction.

If the fairness of any particular set of rates is under consideration there must, of course, also be considered the estimated earnings of the utility under the proposed system of rates and the probable cost of operation.

In the gradual development of the theory of valuation since the case of Smyth vs. Ames the various state commissions, state Supreme Courts and various Federal courts, including the Supreme Court itself, have exhibited a growing tendency to ignore the second of these evidences of value and to focus attention more and more upon original cost plus subsequent net capital additions and reproduction cost as of the time of the inquiry.

During the pre-war period the difficulty or even the impossibility of determining the original cost of many properties, together with the fact that in many cases reproduction cost as of the time of the inquiry was not widely different from the normal construction cost as of the time when the property was originally built, led frequently to reliance in large degree upon cost to reproduce, using the unit prices as of the time of reproduction, unit prices averaged over a term of years prior to the valuation or unit prices determined by careful study of the trend of prices for the various basic commodities involved.

The coming of the war changed the situation materially. Wages and commodity prices rose by leaps and bounds, carrying up with them cost of reproduction at current prices, until, at the peak, cost of reproduction at current prices exceeded original cost or pre-war reproduction cost by 100 per cent or more. Regulatory bodies, therefore, found themselves suddenly confronted by two problems. In valuing a new property, which of the two measures of value, easily comparable in the pre-war period but now widely divergent, should be given controlling weight? In valuing a property which had previously been valued, should the new valuation be limited only to subsequent capital additions or should the whole problem be reopened and reconsidered on the basis of present-day conditions?

The problems thus presented were complicated by the fact that several minor questions, on the answers to which the main question must necessarily depend, could not be answered. For example, was the price increase permanent or merely temporary? If the former, had we entered upon a new price level, and if so, how high was it? If the latter, would prices promptly return to their pre-war level or would this return be long delayed?

Under these conditions we would naturally expect to find a wide divergence between the various regulatory bodies as to the weight which should be attached to the various evidences of value. This expectation is fully realized when we make a study of recent commission decisions. It is doubtful, in fact, whether any two state commissions hold exactly the same point of view toward the problem.

As indicated above, they pay practically no regard, however, to the amount or market value of securities, and the various differences which are found between them grow chiefly out of their treatment of the elements of original cost and reproduction cost.

Disregarding minor differences, however, it is possible to group the commissions under certain general classifications as listed below:

GROUP I. REPRODUCTION COST CONSIDERED

Class A.—Commissions belonging to this class refuse to recognize either original cost or reproduction cost as of the present date as controlling and have no definite method of relative weighting for these two evidences of value.

In general, they consider all evidences of value which are presented and all other matters or circumstances which they feel have any bearing upon the case, and then announce a value which they believe to be the fair value under all of the circumstances. Certain of the decisions rendered by the commissions in this class lean strongly toward original cost so far as the final value is concerned, and others lean strongly toward reproduction cost under present-day prices, but the commissions themselves disclaim any recognition of either element as, in general, controlling.

Class B. — The commissions in this class regard reproduction cost under present-day prices or those probably in force in the period while the rate is in effect as dominant or controlling.

Class C.—The commissions in this class recognize as dominant a reproduction cost based not upon present prices but upon average prices over a five-year or ten-year period prior to the time of the valuation.

Class D.—The commission in this class regards the investment value as controlling for new properties, but when a property is more than ten years old the commission is disposed to follow reproduction cost based on unit prices for the ten-year average.

Class E.—The commissions in this class hold that since rates are to be effective for a future period they should be related to the value as of that period, and that therefore fair value for rate making is reproduction cost with unit prices as of the time during which the rate will probably be in effect.

GROUP II. REPRODUCTION COST IGNORED

Class F. — The commissions in this class regard original cost or, in some cases, historical reproduction cost, by which they mean a reproduction cost using for each unit so far as possible the normal cost at the time when it was supposedly installed, as dominant or controlling.

Class G.—The commissions in this class hold that fair value should be the prudent investment.

GROUP III. SPECIAL THEORIES

Class H.—The commissions in this class use what is sometimes termed the split inventory method. Under this method property installed prior to the war is taken at its fair pre-war value, either as valued at that time by a commission or usually on a reproduction cost as of a definite date or as averaged over a period. To the sum so obtained there is added the actual cost of war and post-war additions. and the sum so secured is taken as fair present-day value.

Class I.—The commissions in this class vary the theory of Class H by allowing on the pre-war property an appreciation for change in price scale. This theory has been worked out most fully by the state of Virginia, which has built a definite working formula for valuation cases.

Class J.—The commissions in this class have taken the position in dealing with applications for revaluation that present fair value is the value formerly found plus the net capital additions to date.

Class K.—The commissions in this class have no general policy.

SUMMARY OF COMMISSION DECISIONS

The committee has digested the commission and court decisions as reported in P. U. R. for the years 1920, 1921, 1922 and 1923 to May and classified them under the above plan. The results, so far as the commissions are concerned, are shown in condensed form in Table I, giving for each year the number of commissions whose reports seem to put them in the class indicated and the percentage of the commissions in the class to the total number of commissions reported. Fractions were used where the decisions for a given year seemed to fall in more than one class.

The committee then wrote to each commission asking for an expression of opinion on this question. A number of commissions have made no valuation rulings and others felt that they should not express themselves except through official rulings, but twenty-six of the commissions replied with sufficient fullness to enable the committee to classify them.

The significant thing in this tabulation is the evidence it affords of a steady drift toward Group I and particularly toward Class A.

STATE COURT DECISIONS

The decisions of the state courts of last resort seem to show less variation than the decisions of the commissions, although there is, of course, a much smaller number of adjudicated cases.

Thus we find in Class A the Supreme Court of Illinois, the Supreme Court of Kansas, the Supreme Court of Missouri, the Supreme Court of New Jersey, the Supreme Court of Appeals of Virginia and the West Virginia Supreme Court of Appeals.

Still in Class A, but with a strong leaning toward Class F, we find the New York Supreme Court.

In Class B we find in 1920 the Michigan Supreme Court.

In Class J, on the question of the treatment to be given to a previous valuation, we find the Washington Supreme Court.

FEDERAL COURTS

The Federal courts also incline strongly toward Class A, as will be seen by an examination of the following cases:

United States Court of Appeals of the District of Columbia in re Potomac Electric Power Company vs. Public Utilities Commission, P. U. R. 1922 B, 680.

United States District Court of Min-

TABLE I—CLASSIFICATION OF COMMISSIONS

	By decisions in years noted								By Replies	
	1920		1921		1922		1923			
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Class A	1¼	6	3	18	7⅓	30.55	4½	37.50	14	53.84
Class B	¾	4	0	0	1⅓	5.56	2	16.67	½	1.92
Class C	3¾	19	2	12	⅓	1.39	..	...	2	7.69
Class D	..	...	..	...	..	.....	..	.....	1	3.85
Class E	..	...	..	...	½	2.08	..	.....	½	1.92
Total Group I	5¾	29	5	30	9½	39.58	6½	54.17	18	69.22
Class F	7¾	39	5½	32	6½	27.08	1½	12.50	3	11.54
Class G	..	...	..	...	..	......	..	......	1	3.85
Total Group II	7¾	39	5½	32	6½	27.08	1½	12.50	4	15.39
Class H	6½	32	4½	26	4½	18.75	2	16.67	2	7.69
Class I	..	...	1	6	2½	10.42	2	16.66	1	3.85
Class J	..	...	1	6	1	4.17	..	.....	..	.....
Class K	..	...	..	...	..	......	..	......	1	3.85
Total Group III	6½	32	6½	38	8	33.34	4	33.33	4	15.39
Grand total	20	100	17	100	24	100.00	12	100.00	26	100.00

nesota in re City of Winona vs. Wisconsin-Minnesota Light & Power Company, P. U. R. 1921 A, 146 and P. U. R. 1922 C. 461.

On the other hand we find in Class B:

United States District Court for Missouri, in St. Joseph Railway, Light & Power Company vs. Public Service Commission, P. U. R. 1921 A, 540.

GALVESTON ELECTRIC COMPANY CASES

Galveston Electric Company vs. Galveston reported in P. U. R. 1922 D, 159, has been perhaps more frequently misinterpreted than any other recent case of the Supreme Court. The company and the municipality both abandoned the evidences of value approved by the case of Smyth vs. Ames and attempted to determine fair value on the reproduction method, using not current prices but the prices assumed as average prices for the future.

The value had been reached in the lower court, not by weighting the various measures of value recognized in Smyth vs. Ames, but by assuming that in the post-war period the country would settle down on a new price plateau and that the company should be allowed reproduction value determined by the unit prices of this new plateau.

The master and the lower court set this new plateau 33⅓ per cent above the pre-war level, while the company contended that it should be from 60 per cent to 70 per cent above the pre-war level.

Both contestants appealed on this point and others to the Supreme Court of the United States, and the question presented to that body was practically this:

Both contestants having agreed to ignore the usual evidences of value and to determine value by an estimate or prophecy as to future economic conditions, is there any thing in the record or anything of which the court shou'd take judicial notice which will make the action of the master in refusing to prophesy a level above 33⅓ per cent reversible error? The United States Supreme Court held that there was nothing which constituted reversible error in this action of the master, but it did not express an approval of the method or express any opinion as to the accuracy of the master's or the company's costs.

SOUTHWESTERN BELL CASE

The case of Houston vs. the Southwestern Bell Telephone Company, reported in P. U. R. 1922 D, 793, unquestionably takes the United States Supreme Court out of Class F, but it does not, as has been sometimes stated, put the Court in Class B. The decision is an unequivocal assertion that the company is al'owed to earn a fair return upon its present value or upon the value of the property used and useful at the time when it is used, but there is nowhere in the decision any assertion that present-day reproduction cost and present-day value are identical.

The decision of the United States Supreme Court in the case of Missouri vs. Public Service Commission, dealing with the valuation of the Missouri properties of the Southwestern Bell Telephone Company, was handed down on May 21, 1923.

In this case below the company had put in a valuation showing a reproduction cost as of June 30, 1919, of $35,100,471 and an actual cost as shown by the books of $22,888,943. The latter figure, however, did not include the cost of establishing the business, included in the former figure at $5,594,816.

The commission had not valued the entire property of the company, but had valued the property at three of the exchanges in the state in 1913, 1914 and 1916, the last of these representing, however, less than 9 per cent of the total value of the three exchanges. The company's valuation was made up by exchanges and it was therefore a simple matter to compare the commission's value on these three exchanges with the company's value on the same property.

The commission added to its earlier value on the three exchanges the net capital additions and determined the ratio of the total so secured to the company's reproduction cost. This ratio they applied to the company's reproduction cost of the entire property and reached a value of $20,350,000 or, on a similar process for reproduction cost less depreciation, $20,400,000. This latter figure was fixed as the tentative value of the property.

It is evident that this, as the Supreme Court says, undertakes:
'to value the property without according any weight to the greatly enhanced costs of material, labor, supplies, etc., over those prevailing in 1913, 1914 and 1916."

The court then emphatically reaffirms its former ruling that present value and not cost is the determining factor and repudiates the methods that are followed by the commission in the following terms:

"It is impossible to ascertain what will amount to a fair return upon properties devoted to public service without giving consideration to the cost of labor, supplies, etc., at the time the investigation is made. An honest and intelligent forecast of probable future values, made upon review of all the relevant circumstances, is essential. If the highly important element of present costs is wholly disregarded such a forecast becomes impossible. Estimates for tomorrow cannot ignore prices of today."

From the viewpoint of the Supreme Court, therefore, there was evidently no finding of "present value," but there was in the record testimony (with no substantial evidence to the contrary) that the value was at least 25 per cent in excess of that found by the commission. The Supreme Court found that a value of $25,000,000, slightly less than that fixed by this uncontroverted testimony, would make the rates ordered by the commission confiscatory and therefore reversed the judgment of the lower court sustaining the commission.

This decision did not fix the value of the property of the company at $25,000,000, but merely determined that it was not, as judged by the record, less than that. It did not determine the weight to be given to reproduction cost, but did determine that it cannot be ignored. Finally, it is a demonstration of the importance of presenting testimony as to "present value" as distinct from costs, whether original or reproduction.

The case, however, is particularly important because of the dissenting opinion filed by Justices Brandeis and Holmes, which is a strong presentation of the prudent investment theory.

ATLANTA AND BLUEFIELD CASES

The Atlanta Gas case and the Bluefield Water Works case were both decided on June 11, 1923.

To those who have regarded the Southwestern Bell Telephone case as holding that present-day reproduction costs are a controlling measure of present value the Atlanta Gas case came as a distinct shock, and many critics, including one justice of the Supreme Court itself, insist that these two cases cannot be reconciled. To those, however, who regarded the Southwestern Bell Telephone Case as holding merely that present-day reproduction prices must be considered and given reasonable weight, it does not seem impossible to reconcile the Atlanta Gas decision with that in the Southwestern Bell Telephone case.

In the Atlanta case the commission below claimed that it had given full consideration to present-day reproduction costs. Both the District Court and the United States Supreme Court found that "the opinion of the commission evinces a full and conscientious consideration of the evidence."

The lower court also held that the commission's statement of the applicable rules of law was sound, and that, while it might differ from the commission as to the application of those rules, the resulting changes in the final figures would not be sufficient to justify a reversal.

The commission in dealing with this case had taken the value of the portions of the plant in existence in January, 1914, and allowed original cost or reproduction cost as of that date undepreciated. To this sum it added $125,000 as a recognition of the appreciation in land values, and also added approximately $1,000,000 of additions made during the period from January, 1914, to September, 1919, at actual cost, although since the hearing came in the last three months of 1921 the strict application of the reproduction cost theory would have shown a reproduction loss upon a part at least of this investment.

The lower court held that this action in this particular case resulted in a figure which gave sufficient weight to present-day unit prices, and therefore sustained the commission, an action which the United States Supreme Court refused to reverse.

In the Southwestern Bell Telephone

case, on the contrary, the commission's figures were based upon 1914 reproduction costs depreciated, no allowance was made for the appreciation of land during the war period, and the additions were entered at cost, which, since the hearing occurred at the end of 1919, was below reproduction cost as of that date. There was therefore no evidence of any consideration whatever of present-day unit prices in the determination of value, and the decision was accordingly reversed by the Supreme Court.

In the Bluefield Water Works case the commission ignored reproduction at present-day prices, ignored testimony as to present fair value, fixed a value below its own revision of the company's reproduction costs on prewar basis depreciated, below its own engineer's reproduction costs at 1915 prices depreciated, and only 1 per cent to 2 per cent above a depreciated cash investment.

Under these circumstances the Supreme Court held that there had been no recognition of present-day costs in the determination of the value, and therefore reversed the commission.

General Summary of Decisions

If we attempt to examine the various conclusions reached by state commissions and Federal courts it becomes evident at once that there is no uniform rule and apparently no tendency toward a uniform rule by which one may determine the weight to be attached to the various evidences of value. If we attempt to generalize for the country as a whole, the conclusions which we can reach are extremely limited. They are, perhaps, as follows:

(a) The fair value of Smyth vs. Ames is present value.

(b) Original cost is not controlling.

(c) Reproduction cost at current prices is not controlling.

(d) No one of the various set rules by which commissions have reached reproduction cost on the basis of unit prices averaged over a period of years (Class C), or have reached fair value by a split inventory method (Class H), or by a combination of pre-war costs appreciated and subsequent capital investment, has been approved by any court of last resort. It is true that decisions resting upon these theories have been approved, but the approval has been an approval of the decisions because the formula took into consideration all of the evidences of value, rather than an approval of the formula.

(e) The so-called "prudent investment" theory, the "reproduction cost of equivalent plant" theory, and the "reproduction cost of unit prices during the time the rate will probable be in force" theory, while mentioned approvingly by various commissions, have not been approved by the courts.

(f) A commission which adopts a basis of value which clearly and demonstrably shows that it has considered and given reasonable weight to all of the elements of value seems to run little danger of reversal by the courts.

If we forget for a moment the decisions of the various commissions and courts and attempt to approach this subject from a practical economic viewpoint, we find at once that there are two distinct methods of approach to this important question, and that utilities and municipalities alike have shifted from method to method as change in economic conditions made first one and then the other advantageous to their particular ends.

Comparison of Valuation Methods

The first method asks for a return on the investment. It is argued that one of the prime requisites for a successful public utility in a growing American community is a constant and adequate supply of new capital; that new capital must be secured either upon a speculative or upon an investment basis; that the development of the theory of regulation by state and Federal governments has destroyed any chance of a speculative reward, and that therefore the business must be put upon an investment basis or have its supply of new capital dried up. But if the business is to be put upon an investment basis, the investor must be assured that the dollar which he invests in the business will remain in the business subject only to the chance of loss by mismanagement or to loss by such change in the prosperity or in the life and habits of the community as will make it impossible for the business to earn a fair return upon this investment at any charge under which business is possible.

In other words, the investor must be assured that the dollar which he places in the business will not be scaled down because later it proves possible to replace the business or equipment for a less sum. If the investor is given this assurance, however, he must consent on his part that he will not claim any increase in the dollar invested because of a changing scale of construction costs.

There still remain, however, the speculative elements of premature obsolescence, change in population drift or decrease in the investor's return due to a general change in the purchasing power of the dollar. Theoretically, these speculative elements may be compensated by allowing an amortization of obsolescence and by adjusting the rate of return to the change in the purchasing power of the dollar. The fact, however, that the obsolescence may be too great to be amortized by any rate economically possible, and the difficulty of securing commission or court approval of a rate of return which would compensate for the change in the purchasing power of the dollar, still leave a large speculative element in the business, which it would seem impossible to remove by anything short of an absolute governmental guarantee.

The investment theory as commonly discussed is, however, vitally weak in that investment is always expressed in terms of mixed dollars. Dollars invested before the war have an entirely different meaning and weight from dollars spent in the past five years, but they are all thrown in together on the books. The business of every day life is done in terms of the money of today and when the amount of an investment is stated it should be stated in terms of the money of today. The statement of an unweighted mixture of different kinds of money has not true meaning.

The second method does not look to a return upon investment, but to a return upon property or a return upon value. Logically, of course, if a man is to look for return upon value, it must be the value which he now has, not the value which he had at some time in the past or the value which he is to have at some time in the future, and the adherents of this method face at once the prime difficulty in its application, the necessity of determining present value.

If we eliminate for the moment the consideration of the value of the going concern and limit our thought to the idea of plant value, and if we measure value as in ordinary commercial transactions by the price or amount of money at which there will be a relatively free movement of property between a group of buyers and a group of sellers in an open market, neither group being under the compulsion of economic necessity, certain basic facts at once become evident:

First—Present value is not necessarily represented by cost. It may be above cost if construction prices have increased or if drift of population or other phenomena of community development have given an enhanced value to the location of the plant; it may be below cost if construction prices have decreased, if a change in the art has reduced the relative efficiency of the plant, or if drift of population or other phenomena of community development have left the plant in a disadvantageous situation or have destroyed or lessened the demand for its service.

Second—Present value is not necessarily represented by reproduction cost at present prices or at prices averaged over any number of years. If construction costs are temporarily abnormally low the seller will withdraw the property temporarily from the market, or the buyer, convinced that he could not complete the construction during the period of low costs, will offer a sum in advance of reconstruction cost at current prices. If reconstruction costs are temporarily abnormally high the buyer will withdraw from the market unless the seller makes a concession in price in order to move the property. If population drift has left the plant in a disadvantageous situation, if a change in the public habit has lessened the demand for its service, or if the plant itself is in bad condition, the seller must make a concession below reproduction cost in order to move the property.

Third—But if the plant is reasonably adapted to its purpose or by extensions and additions can be made so without scrapping any appreciable portion of it as it now exists, if it is in good repair, if there is a reasonable market for its service, and if construction costs (including therein cost of land and cost of money) are reasonably stable, present value as defined above is equal to or closely approximates reconstruction cost at current prices.

Abstractly considered, the debate between the adherents of these two methods of approach to the problem of fair return might continue indefinitely, since much is to be said in favor of each of them, but when we come to consider the subject from the practical side a new element enters.

The state or the municipality claims the right to regulate the charges made by a utility and the natural tendency of such regulation is downward. The only limit to this downward regulation is to be found in an appeal to the sense of fairness and good business judgment of the legislative authorities or, when this is not successful, to the restraining hand of the courts.

The power of the courts to restrain a legislative body is found only in the fundamental law, the constitutions of the states or the nation. An examination of these documents reveals the fact that the only restraints on such legislation lie in prohibitions against taking private property for public use without due compensation, or in the prohibition against depriving any person of his property without due process of law, which is construed to mean without a determination and payment of an adequate recompense. It follows, therefore, that so long as the courts continue as at present to hold that the taking of the property for public use comes at the time of the establishment of the rate, rather than at the time the property is first devoted to the public service, the "return on investment theory," whatever may be its economic virtues, has no legal standing or foundation in state or Federal constitutions and that the utility which attempts to base its rights upon this theory will find itself deprived of its final protection against legislative aggression, particularly in view of the recent action of the United States Supreme Court.

Even if the courts should in the future adopt the basis of valuation described under the heading of investment or original cost theory, they could not adequately protect the utilities at times when the price levels may have changed to a point where the property could be duplicated for any material amount under the original cost, because the courts could not, in the absence of appropriate legislation, prohibit either private or municipal competition.

We recommend, therefore:

1. Our member companies, in approaching the question of valuation before a commission or other regulatory body or before a court, should submit full evidence at least as to original cost, present-day reproduction cost, present and probable future trend of unit costs, and direct testimony as to present-day fair value. They should endeavor to reach with the regulatory body a fair, equitable conclusion as to a reasonably stable level of unit costs and an equitable working figure as to such unit costs, if any, as may be admittedly still unstable.

2. In the case of properties in serviceable condition and adapted to their purpose, our member companies, in view of controlling court decisions, should take a firm stand for a present plant value approximately equal to reproduction cost at stable unit prices as above and for a fair return upon that value, to which there should of course be added going concern value and other non-physical elements.

We recognize the fact that this conclusion, if followed, may be said to introduce into the public utility business a speculative element, which we regret, and that it may call for revaluations from time to time, but we recognize the fact that no agreement, even though it be made between the utility and the regulatory body, would be binding upon the successors of the present personnel of the latter, and that under the existing condition of the law such an agreement would not be enforced by the courts in the event of a marked change in price levels. The utility which enters into such an agreement, therefore, merely bars itself from any advantage in the case of an increase of unit costs, without protecting itself against the disadvantage that follows from a decrease of unit costs. Whatever our ideas may be, therefore, as to the soundest economic theory, and the desirability of maintaining the securities of our companies in the investment rather than in the speculative class, the protection of the properties in our care compels us to follow the only theory by which we can retain judicial protection against political aggression.

PRICE TRENDS

The 1922 committee on valuation embodied in its report a recommendation "that a study be made of price trends and a method worked out by which they may be used in determining the fair value of the property useful and used by the company at the time of the inquiry." In undertaking to carry out this recommendation the present committee understands that the "trends" in question had reference to pre-war prices and their general upward movement during a period of about twenty years preceding the World War, and that the recommendation was prompted primarily by the method adopted in a number of appraisals made during the period of war disturbances of using, not prices current at the time of the inquiry or at the time of actual construction, but those which might have prevailed at the time of the inquiry if the war had not occurred and pre-war price trends had continued. In accordance with this understanding the "trend prices" discussed herein are the prices obtained by projecting the trend of pre-war prices through the war period to the present or some future date.

The object which engineers who have used trend prices have sought to attain was doubtless to arrive at a value higher than pre-war levels, which some authorities sought to retain, yet lower than would be obtained by using current prices which, until two years ago, were undergoing violent fluctuations and which were commonly rejected by regulatory commissions as abnormal. There has been comparatively little recent use of trend prices in valuation work, but in a 1922 rate case in which the company's appraisal embodied such prices the commission pointed out the difficulties of determining correct trends and the errors which would result from lack of suitable skill and judgment in their selection.

It is the opinion of the committee that it should not report upon this subject without giving careful consideration to price movements and their causes covering a considerable period of time, and that it may include in its report comments as to current price movements and opinions as to future tendencies, as well as such statements as to past trends as it believes may be helpful. The subject, therefore, logically divides itself into three parts: (1) Pre-war prices; (2) war period prices; (3) future prices.

PRE-WAR PRICES

There are available to the committee several carefully prepared wholesale price indexes which conform more closely to the cost of public utility construction than do other general compilation of prices. The most commonly used of these indexes is probably that of the United States Bureau of Labor Statistics covering a continuous series of figures since 1890, embracing at the present time more than four hundred commodities, the prices of which are weighted in proportion to their quantity production. The series from 1913 to date was revised in 1922; the basis of weighting used was the production data contained in the 1919 Census of Manufactures in place of 1909 data previously used. More recently the bureau has revised the balance of the series back to 1890, using 1919 weighting data. The changes from earlier index numbers are quite small prior to 1916, and so the full revised series has been used in the following discussion.

For a fifty-year period prior to this series similar but less extensive and probably less accurate figures were compiled by a congressional committee and embodied in Senate Document No. 1394, commonly known as the "Aldrich Report." Similar indexes have been sytematically compiled in other countries for a somewhat longer period, going back in England to about 1800, Special studies of prices in England have also been carried back for over five centuries prior to regular price compilations. Viewed in perspective these early data are of little value in connection with the present inquiry. They show, as is to be expected, an upward tendency throughout the centuries, the causes of which are too remote for helpful present analysis.

Wholesale prices in the United States

for the entire period of their compilation, excluding the World War and previous war peaks, have shown no marked upward tendency. Prices in England, with similar exclusions, have been closely consistent with those in the United States. It is only during the last thirty years that an extended, definite upward trend has prevailed. During the preceding fifteen years an equally pronounced downward trend occurred. The extent to which such trends are now significant depends upon their fundamental causes. The downward movement ending in 1896 was in part the result of an unprecedented expansion of industry, the introduction of labor-saving machinery and a wide extension of agricultural activity, with correspondingly increased transportation facilities. This period also saw the origin and development of electric public utility service, including electric light and power, electric railways and telephones. The twenty years ending with the outbreak of the World War lacked such pioneer development and expansion but, instead witnessed a marked development of labor organization, attended by curtailment of working hours and restriction of production which to a large extent offset the growth in per capita production normally resulting from increasing labor-saving appliances and contributed to an increase in price levels. If, as it appears, industrial conditions which prevailed during the past thirty years, and which will probably continue in the future to a considerable extent, are substantially different from those previously existing, the usefulness of extending price trend studies beyond this period into the past is doubtful.

BUREAU OF LABOR INDEX CHOSEN

After a study of the various price indexes available for this period, the committee has selected, for the purpose of illustrating trends, the all-commodity wholesale data of the Bureau of Labor Statistics as most representative of general price conditions. An index of the Harvard Economic Service covering a much more restricted but more sensitive group of basic materials shows wider fluctuations but almost exactly the same trend. The Dun and Bradstreet indexes show slightly greater and less upward trends, respectively, as should be expected from the different commodities and methods of computation employed.

The committee presents herewith a chart reproducing the all-commodity index of the Bureau of Labor Statistics from 1890 to 1922, inclusive, plotted on semi-logarithmic paper so that on any part of the price curve a certain vertical distance or slope of line represents a uniform percentage or rate of increase. The year 1913, which has been the conventional base of 100 for such curves, is assumed to be the logical point through which a projected trend line should pass. As shown on the accompanying chart, the committee has drawn a trend line following closely the price curve from 1899 to 1913. The line has not been extended through earlier years because of the disturbing effect of business depression and other factors in the preceding years. The projection of this trend line to 1923 gives an index of about 120. An index of 125 is shown in 1926 and of 150 in 1936. The actual wholesale price level is now substantially above this latter point, with an upward tendency, and so, in the absence of recessions in the meantime, the trend index would not equal the actual index until at least fifteen years hence.

In the long run it is to be expected that commodities of various kinds will have prices bearing a reasonably constant relation to each other. This is necessarily the case because otherwise the producers of commodities commanding only a comparatively low price would in time transfer their activities to other more profitable fields. The commodities which are used by the Bureau of Labor Statistics in its index computations are divided into nine general classes. A study of these different class indexes during the period under review shows material departures from the all-commodity average particularly during the war period.

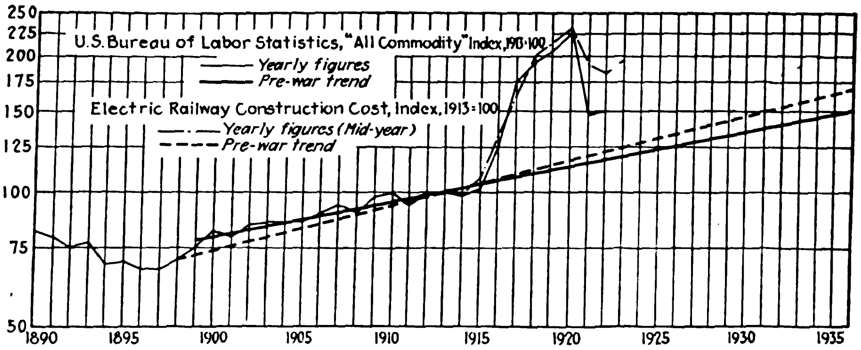

Chart Showing Relation of "All Commodity Index" and "Electric Railway Construction Index" as Compiled by Albert S. Richey

ELECTRIC RAILWAY MATERIAL COSTS

Having in mind that we are concerned primarily with the materials entering into electric railway construction, it is of interest to determine how closely the all-commodity index compares with the two classes of materials included in the Bureau of Labor Statistics series which are most closely associated with electric railway construction requirements. These two classes, building materials and metals and metal products, include about 13 per cent in value of all commodities produced in the United States. A study of the index data shows that during the past thirty years building material prices have followed very closely the all-commodity prices. Metals and metal products, the only other group extensively involved in electric railway construction, show less consistent movements, with an upward but irregular trend.

It is of interest to see how closely more specific indexes of electric railway material correspond with the price curve and trend line accompanying this report. Albert S. Richey, a member of this committee, has compiled an index of electric railway materials for a considerable number of years. For this index he has used fuel, lumber and metals, using the Bureau of Labor Statistics' figures for his combination. A comparison of Mr. Richey's curve from 1914 to date with the Bureau of Labor Statistics' all-commodity curve shows close agreement during the first four years, but materially lower prices for the following two and one-half years, and correspondingly higher levels thereafter. Mr. Richey's curve was not intended as an index to construction cost, having a more direct bearing upon operation and maintenance.

In 1922 Robert M. Feustel, a former member of this committee, completed an exhaustive study of price movements in connection with a valuation of a large railway system. This study included the computation of a series of valuation index numbers for the years from 1892 to 1921, inclusive, weighted in accordance with a recent inventory of the property. The trend of these index numbers shows a reasonable consistency with the all-commodity trend, being slightly less upward and reaching the 150 level at a later date. This particular trend study applies only to one large property, which in certain important respects differs from typical electric railway properties.

The committee has had opportunity to study price data compiled from extensive collections of appraisal and construction cost data made by organizations now represented on the committee, covering a very large proportion of the period under consideration. An analysis has been made of these data and the relation of prices prevailing in the different years determined through a careful weighting of all the various elements entering into public utility construction. In making these appraisals transient fluctuations in prices were commonly ignored, resulting in a curve of prices without the fluctuations shown in the all-commodity index. During the earlier part of the period studied electric railway materials or the labor employed in their assembly in railway properties were somewhat lower than the all-commodity average and a trend line constructed from the weighted indexes of such construction shows a sharper upward tendency than the all-commodity trend; in fact, it reaches 150 level several years earlier, as is shown by a broken line on the accompanying chart.

It should be pointed out that construction work such as buildings and other parts of electric railway properties requires labor of a different character from that employed in commodity fabrication, and subject to different wage movements. The wages of construction employees have increased more rapidly than those of factory workers and have recently continued at relatively higher levels. For this reason, the application of commodity indexes to construction work involving not only commodities but special labor may not yield reliable results, except after a considerable period of industrial stability.

It is obvious that if trend prices, based upon such different indexes as are herein considered, yield widely variable results when projected into the future, they cannot be used as the basis of accurate computations of property value. When it is further considered that objections may be raised to the limiting of trend studies to the specific period selected herein when the upward tendency has been unusually great, the limitations surrounding the usefulness of trend prices become apparent.

In determinations of property value in which neither historical prices nor those prevailing at the time of the inquiry are acceptable to the parties concerned, trend prices are sometimes used as the basis of a compromise. In cases where the expense of new appraisals is undesirable and appraisals of pre-war property at pre-war prices are available, this property might be valued at trend prices (about 25 per cent higher than pre-war prices), adding to such value the actual cost of subsequently acquired property, the total value thus obtained being somewhat below present cost of reproduction. The committee is of the opinion that such compromises have little scientific or economic justification, and it does not recommend any general use of such methods. The determination of fair value being a matter of sound judgment, the injection of evidence of value based upon complicated and uncertain factors is more apt to hinder than to aid the exercise of such judgment.

WAR PERIOD PRICES

While the violent fluctuations in prices since the beginning of the European war have no bearing upon the trend prices so far discussed, the movements in wholesale prices during the last two years are of interest in their bearing upon prices which may prevail in the future. It was more than a year after the beginning of the war when prices in the United States began to rise. There was a fairly steady increase up to the time the United States entered the war, then a slight recession incident to governmental price fixing, followed by another less uniform increase, continuing until May, 1920, when the maximum monthly level of 247 (Bureau of Labor Statistics, revised, 1913 = 100) was reached. From this peak a precipitate decline continued for one year. Since the middle of 1921 the marked downward movement has ceased, and for more than twelve months the tendency has again been definitely upward. The increase during 1922 was about 12 per cent.

The average of all wholesale prices now corresponds quite closely to the cost of living indexes compiled by the National Industrial Conference Board and others. Inconsistencies still exist between different classes of commodities, but, on the whole, the tendencies of the various groups and of single commodities have been toward the general average. This is particularly true of copper, so important in electrical industries, which, until a few months ago, was radically out of line with other public utility material, but has since moved toward consistency. On the other hand, other metals and building materials, already above the average, are moving further upward under the stimulus of construction activities. Such exceptions to the general trend will continue until demands originating from war-time restrictions are more fully satisfied than has so far been possible.

Electric railway construction costs followed the upward movement of all-commodity prices quite closely during the early part of the war period, but subsequent to the peak have not shown as great a decline, due to the continued high cost of construction materials and labor. A curve showing mid-year cost indexes is given on the chart already referred to.

Until the latter part of 1921 there was justification for designating the prices prevailing during the preceding five years as abnormal. Many people still believed that prices would go back to the pre-war so-called "normal" level, in spite of the active resistance of labor to wage reductions. The committee is not convinced that prices prevailing during and for some years prior to 1913 should now be considered normal any more than equally stable prices at quite different levels at other periods in our history, one of which we may now have entered.

FUTURE PRICES

The question as to whether or not future prices will continue on a level comparable with that prevailing during the past two years, or will gradually or abruptly fall toward the pre-war level, is one of great importance to public utilities, in their operating and construction programs and in rate proceedings. Valuations and rates are fixed by regulatory bodies for application to future periods of considerable length. If during such periods declines in operating and construction costs are to be expected, the regulatory commissions will probably take cognizance of such expectations in their decisions. If, on the other hand, prices for a considerable term of years are to remain at present or higher levels, more weight should be given to prevailing prices in valuation and rate determinations.

In spite of the vast amount of study which has been given to the causes of price movements, there is as yet no complete agreement as to what the fundamental causes are. The committee, within the limitations of this report, cannot enter into an extended consideration of this subject, but it appears desirable to discuss certain factors which are clearly pertinent and through which some approximate conclusions may be reached regarding future price movements.

The normal basis of money, in which prices are expressed, is gold. The gold standard has prevailed in the United States except for limited periods during and following the War of 1812 and the Civil War. It was also in effect in most other important nations prior to the World War, but has since been generally abandoned by the European participants in that war. It is commonly recognized that prices move up and down with the existing stock of monetary gold. Increases in prices have followed all such important discoveries of gold as the California, Klondike and Transvaal fields.

Money itself, however, plays only a minor part in commercial transactions. The bulk of our business is carried on through bank credits which do not necessarily bear a direct ratio to the money in circulation although based upon it. A large part of our monetary gold is not in actual circulation but is held in reserve to support issues of federal reserve notes, which, although limited by the reserve, are not otherwise directly related to it. Nearly one-half of our money now in circulation consists of these notes, and their amount is subject to wide variations at the discretion of the Federal Reserve authorities.

Prices are also affected by the speed with which operations involving the use of money or credit are carried on and by the efficiency with which commodities are produced and marketed. An increase in money turn-over has the same tendency to increase prices as an increase in quantity of money; on the other hand, an increase in efficiency of production tends to reduce prices. There are other factors, involved to some extent in those already stated, which will have at least temporary effects upon price levels in this country. They include our restrictive immigration policy, artificial wage levels maintained through labor organizations, foreign trade balances, high taxes and dwindling natural resources.

All these factors and others of less significance are constantly working to influence price levels. With respect to those tending to maintain high prices, it should be noted that our present stock of monetary gold is nearly double the 1913 amount and is still increasing, although at a steadily diminishing rate. Our European war allies owe us in gold more than the entire monetary supply of the world. In the absence of wholesale inter-allied debt cancellation and the development of unprecedented European trade balances, it is difficult to see how the United States can dispose of any large part of its

gold. Bank credits may be expected to expand with steadily improving bank facilities, the turn-over of money may also increase and the issue of Federal Reserve notes may be enlarged—all to the extent that existing industrial activity may at any time require. The present insistent demands for higher wages, from existing levels well in excess of living cost indexes; renewed agitation for shorter hours and improved working conditions, and shortages of farm and industrial labor, with little relief in prospect through immigration, all work strongly against price recessions.

The possibilities of price reductions lie primarily in an increase in productivity through labor-saving machinery, more efficient and willing labor, more working hours and immigration. Wage reductions, desirable within certain limits in the interests of both workers and consumers, are not to be expected on any large scale. More extensive and efficient use of natural resources, such as water powers, is still possible and probable to a helpful extent. It may be possible to reduce our stock of gold or its effects through debt cancellation, increased imports, or by withholding note circulation based upon superfluous stock. The effect of these various factors tending to reduce prices, even in favorable combination, can hardly be expected for the present or in the near future to outweigh the opposing factors, particularly in the construction field where skilled labor is essential.

PRESENT PRICES WILL CONTINUE

It is, therefore, the opinion of the committee that price levels applicable to electric railway properties as a whole at least equal to those now prevailing will continue for a considerable number of years, after which some recessions may be expected, but not to pre-war levels or any close approach thereto.

It would not be unreasonable to expect that within ten or fifteen years the electric railway price level will approach the projected trend price as shown on the accompanying chart. The committee is of the opinion that more definite predictions are not warranted from the available data.

The committee is not unmindful of the price recessions which have occurred after the close of previous wars in this and other countries. Our Civil War is frequently cited to substantiate a claim that prices will gradually return to pre-war levels. A study of financial history shows that the Civil War price increases were largely due to the issue of greenbacks which were not redeemable in gold until 1879 (fourteen years after the close of the war), at which time prices returned to about the 1860 level. Prices based on gold showed comparatively little fluctuation during the Civil War. Similar reasons, or others showing no greater bearing of past war prices upon the present situation, could be given if further substantiation of present predictions were necessary.

The views with respect to future prices stated herein are shared by all qualified authorities known to the committee, at least to the extent of holding that substantial price recessions are not to be expected before 1930, and that pre-war prices are a closed book.

With the passing of years a steadily increasing proportion of the investment in electric railway property and renewals thereof will have been made on the present plateau of prices, and actual investment will approach more and more nearly the value found through appraisals based on the cost of reproduction at existing prices. The expectation of this future restoration of the consistency between investment and cost of reproduction which existed during the pre-war period of regulation, when the latter basis of value gave results which were generally acceptable, is a further justification for the conclusion stated elsewhere in this report that cost of reproduction based upon stabilized present prices is the most important basis of fair value which courts and commissions alike can use consistently and with justice to all interested parties.

The report was signed by E. G. Bechtel, H. A. Clarke, W. Findlay Downs, J. A. Emery, C. W. Gillespie, F. C. Hamilton, J. B. Klumpp, W. H. Maltbie, L. R. Nash, A. T. Perkins, A. S. Richey, W. H. Sawyer, Frank Silliman, W. B. Tuttle, E. D. Uhlendorf and James P. Barnes, chairman.

New England Club Opens Season with Worth-While Program

Some New Thoughts Brought Out on Light-Weight Cars, Standardization of Air-Brake Equipment, Automatic Substations, Track Construction, and Public Relations—Two Hundred Attend Evening Dinner at Boston

SOME very worth-while talks on practical subjects and an enthusiastic gathering marked the first of the season's meetings for the New England Street Railway Club at Boston on Oct. 25. It was presided over, both afternoon and evening, by the president, Ralph Hood, and there were about 200 present at the evening dinner.

J. C. Thirlwall, General Electric Company, discussed lightweight city and interurban cars and the results obtained. He recalled how some engineers had thought the original safety cars were too light, but he said actual experience has not borne out this fear. The present maintenance cost on the Birney safety cars installed five years ago in Fort Worth, Tex., the original installation, is less than 2 cents per car-mile. The average for all safety cars used in Texas is running about 1.75 cents per car-mile, as against 3.5 cents per car-mile for the older and heavier type cars on the same properties.

Speaking of the installation of lightweight one-man cars in interurban service in the Middle West, Mr. Thirlwall said that for the cars of the Cincinnati, Lawrenceburg & Aurora Railway, which have now been in operation five years and are operating 96,000 miles a year, the maintenance cost for the first six months of 1923 was 1.46 cents per car-mile, and that it has averaged 1.48 cents per car-mile for the five-year period. These cars have netted a total saving of $220,000 in five and a half years on an investment of $100,000, of which $60,000 was almost immediately returned through sale of the old cars and taking down of copper.

The first year of operation of the light-weight one-man cars of the Kentucky Traction & Terminal Company, Lexington, Ky., showed 38 per cent increase in car mileage, 30.5 per cent increase in passengers, 12.7 per cent increase in passenger revenue, a reduction of 37 per cent in expenses, a reduction in the power demand of 350 kw., and an increase in net income of 102 per cent.

The 32,000-lb. cars of the Western Ohio Railway, equipped with 35-hp. motors to maintain the same schedule speed as the heavier cars which they replaced, showed a maintenance cost for the first five months of 1923 of $2,893, compared with a maintenance cost for the old equipment of $5,070 for the first five months of 1922, and a corresponding reduction in power cost from $24,261 for the first five months of 1922, to $15,765 in 1923. These two items alone indicate a saving of more than $10,500 in five months.

He mentioned the cars soon to be delivered to the Indiana, Columbus & Eastern Traction Company, which represent a further development of the light-weight car idea. They will weigh 50,800 lb., seat fifty-six, and are equipped with four 60-hp. tap field motors geared for 55 m.p.h., which they will actually make. The cars which they displace weigh 86,000 lb. and while geared for 60 m.p.h., actually make only 54 m.p.h. on account of the voltage drop which will not prevail with the new cars because of their smaller energy consumption.

From these examples, Mr. Thirlwall commented that it is evident that very material weight reduction can be accomplished in practically all types of cars.

STANDARDIZATION OF AIR BRAKES FOR LIGHT CARS URGED

E. W. Davis, Westinghouse Traction Brake Company, talked on the subject of brakes and safety devices as applied to light-weight cars. He spoke of the advantages which had accrued from the approach to standardization with the Birney safety cars, which enabled the air-brake manufacturers to furnish equipment from stock—a thing which has never been possible with any other electric cars. He said that the standardization of brake equipment had gone very much farther in the steam railroad field than in the electric. For example, one type of triple valve for passenger cars, another type for freight cars, and a third type for locomotives, have almost universal use. By contrast, a great number of different types are required for the electric railway field.

Mr. Davis then discussed briefly the variable load brake which has been found desirable for the light-weight cars where the live load may be a considerable per cent of the total load. The first application of these brakes has been made on double-truck cars, but Mr. Davis said that it was his hope that such brakes might soon be available for use on single-truck safety cars. He said this type of brake ought to be installed on all new cars of the lighter type purchased henceforth, and it might even be worth while to consider putting them on some of the older cars now in service.

In discussing the various types of braking and safety equipment, including door control, Mr. Davis pointed out that it is possible to meet practically any condition the railway may set up, but he urged that if the railway wants the best service from all of the manufacturing organizations, it will be more likely to get it by using something that they are making regularly in large quantities.

To give an idea of the lack of uniformity in equipment used in the electric railway field, Mr. Davis said that he had in mind ten or twelve different companies which had bought cars within the last year, all of which might be classed as light-weight double-truck cars largely for one-man operation, and there were no two cases in which the door operation was the same. In two cases the Brake Company even had to build special brake equipment, and in several other cases it built other parts of equipment which will probably have no application on other properties. Nearly all modern manufacture is conducted by large organizations, and while they can provide some flexibility in their operations, so many special developments are bound to be costly to the consumers.

Charles F. Johnson, of the J. G. Brill Company, spoke briefly on the various types of car bodies applied to light-weight cars.

FIELD OF AUTOMATIC SUBSTATION EXPANDING

C. A. Butcher, Westinghouse Electric & Manufacturing Company, discussed the application of automatic substations and said that there are now in operation or on order some 500. He said that the Cleveland Railway is at present contemplating an expansion of its present automatic substation installation to include ultimately thirty automatic substations. There will be a supervisory control, by which it will be possible to open and close any feeder, start or stop any machine, transfer the load from one high-tension line to another at any station, and obtain a continuous graphic curve of the load at each station—all of which is done by means of a two-wire line to each substation, which can also be used as a telephone line.

In Baltimore, four automatic substations are shortly to be installed. An interesting development here is that not only does the location of substations at the load centers reduce materially the cable losses, but it is possible to regulate so as to provide that voltage which will be most economical for the traffic conditions prevailing in the district. By means of various taps on the transformers, the d.c. voltage may be varied from 500 to 600. It was impossible to calculate what the most economical voltage would be, and therefore various taps were provided and they will be tested out over a period of operation to find the most economical voltage for the particular traffic conditions in each district.

Mr. Butcher said that the advent of supervisory control has greatly expanded the field of automatic substations and automatic control of generating stations. He said it was possible now to picture in the future one man sitting in an office building who would have absolute control over the entire generation and utilization of energy in a community.

Referring to Mr. Butcher's comment on the advantage of being able to locate an automatic substation just where it was needed, J. C. Thirlwall said that this was sometimes very difficult on account of the objections to a substation in residential sections. He told how the Los Angeles Railway had overcome this difficulty and had built three automatic substations in high class residential districts and had succeeded in making them absolutely noiseless. He said you could put your ear against the door and could not tell whether the machine was running or not. It cost about $10,000 extra to accomplish this noiseless feature and to give the station a decorative appearance, but the interest on this added investment is earned in the first two months of each year as a result of savings from having the station where it is actually needed.

R. B. Fehr, Rail Welding & Bonding Company, Cleveland, gave a very interesting blackboard discussion of the technique of seam welding of rail joints. The possibilities for making these joints more efficient were outlined as: (1) Careful preparation of the joint at the rail ends and tight bolting to secure good alignment and some initial compression; (2) improved method of welding, including the hand feed method of applying the metal; (3) increasing the section modulus of the joint; (4) applying a thick seam; (5) interrupting the base seam for a distance of 6 in. at the center.

RAILWAY MEN TALK OPERATING MATTERS AT DINNER

While all of the talks at the afternoon meeting were supplied by manufacturers' engineers, railway men occupied the platform entirely after dinner. Edward Dana, general manager Boston Elevated Railway, reported briefly on some aspects of the Atlantic City convention. He paid a tribute to former president C. D. Emmons, saying that a large measure of the success of the convention was attributable to his leadership. He thought it was a healthy sign, not a bad one, that the bus occupied 24 per cent of the exhibit space at the railway convention. He thought the convention marked the full realization that bus and street car will go together in future transportation. He proposed, and the convention voted, a resolution congratulating Britton I. Budd on the success of the Chicago, North Shore & Milwaukee Railroad in being awarded the Charles A. Coffin prize for 1923.

H. M. Steward, superintendent of maintenance Boston Elevated Railway, addressed the meeting on the subject of new track appliances and practice. He spoke of the new tie exhibited at the convention by the International Steel Tie Company, especially adapted for rebuilding concrete track, the tie being so shallow as to permit leaving in the old construction. He also spoke of the Sandsberg sorbitic process of treating rail, which it is claimed will make the rail last from four to six times as long as untreated rail. The Boston Elevated Railway is trying out some of this. He also spoke of the Barbey frictionless rail, consisting of a narrow head rail for use on the inside of curves. Some of this is being used on the Boston Elevated, and it appears to reduce noise and corrugation and give longer life.

Mr. Steward emphasized the great importance of using machines in track construction work to eliminate hand labor as far as possible. He said that this practice had made it possible to build track now at practically no greater cost per mile than twenty years ago. He outlined the practice of the Boston Elevated as follows:

Track construction is done with gangs of not over fifty men. A portable track is put in where possible, so that one track can be completely tied up. If it is necessary to use cross-overs, however, signals are installed to keep delays to traffic to a minimum.

A pavement plow is used to tear up the old pavement, but the blocks are still picked up by hand. The rails are cut up into convenient lengths by means of an acetylene torch. A crane car tears up the track bodily and lays it out to one side. Electric shovels do the excavating, and the newer ones, equipped with caterpillar tractors, are particularly effective. They excavate the material and dump it directly into motor trucks. A steam roller is used to roll the trench. The new track is assembled in the trench, the ballast distributed, the track aligned and then tamped with pneumatic tampers. Concrete mixers running on the rails are used, and each is accompanied by a loader. The use of loaders cuts the crew down to a minimum, and the scheme followed is to have one batch in the hopper, one in the mixer, and one in the loader simultaneously. The paving is then applied. Of course, welding machines, grinders and miscellaneous tools are used at the proper points in the course of construction.

Mr. Steward said it was only possible to do twelve to fifteen construction jobs in a season, and even this necessitated very quick movement of equipment from one job to another. Each day the construction foreman on a job orders by 4 o'clock the material and machinery he will need the next day. One man is in the office and does nothing but see to it that his needs are supplied, when needed.

Speaking of rail joints, Mr. Steward mentioned the work of the committee on welded rail joints and said that he was convinced in his own mind that the seam-welded joints will be one of two types used on any property. The seam weld will be used very generally, but one of the other types will be used for special locations.

A FEW REMARKS ON SAFETY

Fred A. Cummings, Eastern Massachusetts Street Railway, gave a very lively talk on safety and public relations, saying that he was going to talk from the point of view of "the man who is too poor to own an automobile and is obliged to ride on the street car." He said that the best way for a company to pursue the work of safety is to keep everlastingly at the small details of maintaining the cars and plant in perfect condition, and then bring it right home to the men just what it costs for accidents.

Mr. Cummings stated that nearly every railway assumes a niggardly attitude toward the claims department, but that there is no department which needs the inspiration and deserves the attention of the general manager so much. There is too much of the attitude of wanting to settle every claim, regardless of its merit, and not enough of fighting claims out in court, Mr. Cummings contended.

Referring to the proposed bill to come before the Massachusetts Legislature abolishing one-man operation of cars, he said that the various Massachusetts street railways have operated 55,845,819 miles of one-man operation, and that the accident record has been considerably improved, as compared with two-man operation. He said that this was largely due to the greater responsibility felt and discharged by the individual operator. This was attested by the argument he heard an operator make at a carbarn. The operator said, "This chariot is mine. Nobody gets on or off unless I know it. I'm the guy."

The Electric Railways Have Come Back*

Operating Revenue Greater than Five Years Ago—Net Income Two and a Half Times as Great—Buses Have Failed When Required to Give All Local Transportation

BY JAMES W. WELSH

Secretary American Electric Railway Association

IT IS a most encouraging sign that an invitation from the Investment Bankers' Association is extended to a representative of the electric railway industry to present a brief review of its status. It has not been long since the mere mention of electric railways in the presence of a banker produced a decided chill in the atmosphere. This disposition probably still exists to some extent, but there also seems to have come a feeling of curiosity as to just what is coming next. Apparently everything that could happen to dampen the enthusiasm of the investor in electric railways has already happened, but the cars still keep running.

They are running in New Jersey after an interruption of 50 days, although for a while the issue looked doubtful, but the damage to business and the inconvenience suffered by the public as a result of the stopping of service proved beyond all doubt the essentiality of street railway service. The authorities insisted upon their return, and the people were glad to get them back. They have been voted back overwhelmingly by three to one in Saginaw, Michigan, where service was suspended for two years while the people were misled with make-shift buses and would-be financial plans all of which failed dismally; they are running in Bridgeport, Conn., where service was suspended for 56 days in 1920; and in Toledo, Ohio, where an interruption of 27 days occurred in 1919, while an effort was made to dispense with their service. They are even running in New York City, where hopes of some have been high that, here, of all places, the great bus adventure might be tried.

From all this the conviction is growing that after all the electric railways are essential in providing transportation service. Everyone likes to have an advance tip, and it is rumored that investment bankers are not above this excusable trait of human nature—The tip is this: *The electric railways have come back!*

As you may be "from Missouri," I will ask you to bear with me through some statistics.

CENSUS FIGURES SHOW GROWTH OF 2.5 PER CENT A YEAR

The U. S. Bureau of the Census is just completing its regular five-year census of the electric railway industry. So far the complete financial figures for the country are not available but the traffic figures are: In 1922 out of more than 15 billion passengers including transfers over 12½ billion pay passengers were carried by the electric railway companies in the United States, an increase of one and a quarter billion, or 12 per cent over the previous census of 1917. This is an increase of approximately 2.5 per cent per year while population has increased less than one per cent. Putting this on a unit basis to get the "riding habit," we find there were 117 revenue passengers carried per inhabitant the country over in 1922 as compared with 109 in 1917 and 100 in 1912. These figures definitely put aside the fear that taking the country as a whole, competition from the motor vehicle, either in the form of the common carrier bus and jitney, or the private automobile, is at the expense of the electric railways.

So much for the question of traffic. Now let us consider the matter of fares, for upon these two factors, fares and traffic, hang the revenues of the electric railway. In 1917 the average fare per passenger was 5.1 cents, today it is 7.3 cents and in 1921 it reached 7.5 cents. A trolley ride and a fixed fare no longer are synonomous and the public has come to realize that fares vary in accordance with the cost of service in different cities throughout the country.

Operating revenues of electric railway companies according to Association estimates have increased 47 per cent over 1917 and now are close to a billion dollars annually. The operating ratio which rose from 65 per cent in 1917 to 80 per cent in 1920 for a group of 225 companies fell to 73 per cent in 1922. The net income is approximately 2.5 times the 1917 figures.

The abandonment of electric railway trackage in certain parts of the country has been cited as evidence of the decadence of this mode of transportation and its replacement by another. The government census figures show a track mileage of 43,934 in 1922 as against 44,808 in 1917 or a net loss of 874 amounting to 2 per cent. It is not to be understood, however, that no new extensions have been made. Detail figures on file with our association show that new track developments to the amount of 1,450 miles have been made during the five years while abandonments aggregating 3,320 miles have occurred, the net loss being as above.

One reason for this was that the country was approaching the "saturation point" with respect to electric railways. Practically every community that offered the slightest possibility of successful operation had an electric railway system. And many that did not offer any possibility nevertheless had them anyway, financed usually by real estate speculators who expected to get their money back through increased land values rather than from the successful operation of the railway, though as to this they were not without hope. Another reason for the decline in construction was the rise in prices of all materials with the opening of the world war. This abandoned trackage represents construction in unprofitable districts where the traffic could not bear the cost of service. Every industry constantly experiences such changes and the sooner it recognizes it, the healthier it is for it.

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*Abstract of address at annual convention of Investment Bankers' Association of America, Washington, D. C., Oct. 29-31, 1923.

In many of these places electric railways have installed a bus service rather than have the district without transportation service. A total of about 2,000 miles of bus route is now being operated by railway companies.

Coming to the question of car equipment, our records show that a total of over 13,000 new street cars have been purchased and put in service during this period out of 80,000 in regular operation. These include both replacements and additions to service but they always make friends for the railway. In 1921 there was expended $150,000,000 for improvements and betterments and for the current year it is estimated $250,000,000 in new capital is needed. All of the above facts establish the electric railway as a necessary business with increasing traffic, increasing revenues and increasing facilities.

NOTHING TO FEAR FROM BUS

Those who fear that the motor bus will replace the electric railway might do well to consider the economic and legal principles involved. It has been definitely proved wherever a complete transportation system serving a whole community has been tried by motor bus that the cost is greater than by electric railway, except in instances where the service is infrequent and the density of traffic light.

Examples of profitable operation of the bus at lower fares are frequently quoted as evidences of its ability to undersell the trolley. The fallacy of this contention lies in comparing a rate of fare on one bus route or a group of favorable routes with that of a whole trolley system serving all parts of the community. It may not be generally understood that the earning capacity of various routes in a community vary through the widest possible range and that where a transportation company provides a universal service many long-haul and poorly patronized routes are carried at the expense of the short riders in the densely populated districts all for the great good of the greatest number.

The principle of co-ordinating all agencies of transportation serving the needs of each community rather than to permit a ruinous and destructive competition to develop has been promulgated by the American Electric Railway Association and is generally recognized as sound economic doctrine and in accordance with the principles of public utility regulation and control.

There is, however, one thing to which I wish to direct your attention as investment bankers. This is the type of prospectus frequently circulated for the purpose of attracting investors to this field. I might cite the results of a careful analysis I recently had made of one of these prospectuses. The figures showed that with a small payment down a bus could be paid for out of earnings in 18 months. The life of a bus was estimated at four years and, during the last two and one-half years, a reserve was set up to replace the vehicle. The plan was cleverly conceived and is exceptionally plausible, except that the earnings of the bus are tremendously exaggerated.

This prospectus states that the average daily earning power of a 26-passenger bus is conservatively estimated at $75. I have good reasons to doubt this. Figures compiled by us, from the operating records of 12 electric railways using buses as adjuncts to their rail cars, show that the average daily gross earnings are approximately $29. It may be said, and with some reasonableness, that these operations do not truly reflect the true earning capacity of a bus, as these buses are used in some cases in the less remunerative territories. However, an investigation of the earnings per bus of some of the most successful independent bus companies in the country, confirms our beliefs that the earnings given in the prospectus are entirely misleading.

For example, the average daily earnings per bus on the Fifth Avenue Coach Company's lines in 1922 were approximately $52. It should be noted that these vehicles are of the double-deck type having almost twice the capacity of those referred to in the prospectus and furthermore a 10-cent fare is charged. Also, the traffic density and other operating features combine to assure to the Fifth Avenue Coach Company a maximum earning power for its buses.

In this connection, it might be pointed out that the operating statement of the Fifth Avenue Coach Company indicated that it would be impossible for it to operate on a 5-cent fare, as the operating cost per passenger exclusive of investment charges and taxes for the year ending June 30, 1922 was approximately 7 cents.

Obviously, the whole argument set up in the prospectus referred to, falls like a house of cards when proper figures are substituted in the operating statement presented.

BUSES REGULATED IN MOST STATES

Let us next consider the attitude of the regulating commissions with respect to responsibility for furnishing transportation services.

Twenty-five states and the District of Columbia have enacted legislation requiring motor vehicle common carriers to obtain a certificate of public convenience and necessity from the state commission as a prerequisite to the establishment of any kind of service.

A distinct trend from a policy of encouraging motor bus lines wherever possible to one of affording adequate protection to existing carriers can be traced in the decisions of eleven commissions on petitions for certificates.

In only two states, Illinois and Nebraska, where the commission has authority to grant certificates of public convenience and necessity, have they shown a tendency to encourage development of bus lines at the expense of the railways, and in the state of Illinois at least the courts have stepped in and reversed the decision of the commission.

In many states the commissions have as complete jurisdiction over bus operations as they have over other public utilities, including electric railways. For instance in nineteen states the commission has authority to investigate and fix the rates of fare charged by bus lines; in fourteen states it prescribes routes and in sixteen states it prescribes schedules for bus lines. Seventeen of the state commissions have issued general orders promulgating rules and regulations for the operation of buses. Thirty-six states have imposed a gasoline tax. There are, in fact, only six states in the union which have taken no official action whatever with regard to the buses.

OTHER FAVORABLE CONDITIONS

Another fear that at times impairs the credit of the industry is the threat of political oppression. Probably the most effective weapon against the antagonist is the building up of good public relations. Telling the industry's story to the public, however, has become a national watch-word. This is not a spasmodic campaign but is a continuing activity in keeping the public advised of its responsibility in maintaining its transportation service. Coupled with this has been the introduction of all known means of economical operation. This included one-man cars and for the industry there are now 10.000 in operation as compared with less than 1,000 in 1917. Organized safety methods are resulting in a material reduction in the cost of accidents, which for the industry have fallen from 3.24 per cent of gross receipts in 1917 to 2.68 per cent in 1922.

The use of automatic and remotely controlled sub-station equipment as a factor in reducing power costs has received wide application. This together with the use of power saving devices and a more intelligent use of electricity are resulting in material reduction in the total cost of power. The use of electric and metal composition welding processes has effected material savings in the maintenance and repair departments.

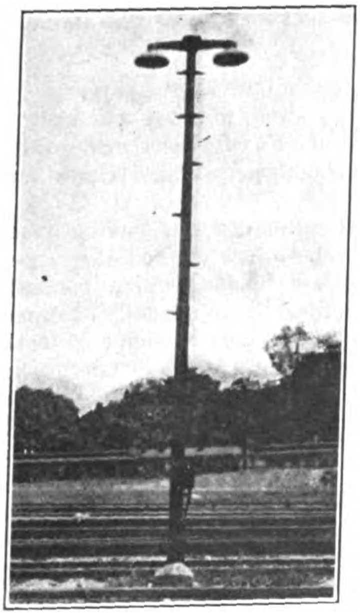
Improved relations with labor have been effected in many places with a corresponding increase in efficiency and elimination of loss through strikes. These are but a few of the economies typical of what wide-awake and progressive companies are doing and which are winning for them success beyond their fondest hopes.

Maintenance of Equipment

Old Trolley Poles for Yard Lighting

THE accompanying illustration shows a trolley pole used to support lights in one of the yards of the New York Rapid Transit Corporation. A few years ago, when building its new subway and elevated lines in Brooklyn, this company constructed elevated structures on several streets which had previously been occupied by surface lines. As the trolley poles of the surface companies could not be used to support the overhead work after the elevated structures had been built, they were taken down and were given to the Rapid Transit Corporation in return for the right to attach the wires of the surface lines to the new elevated structures.

This arrangement gave the Rapid Transit Corporation several hundred trolley poles for which it had no use. While some of these poles could be sold, there were still many left on the hands of the new company and the price received for them was not great. Therefore, when it was desired to light the yards where the subway and elevated cars are stored, a number of these poles were set to support the lighting fixtures and were provided with steps for the cleaning and renewal of the incandescent lamps which were installed, under suitable reflectors, on them. A casting was fitted to the top of the pole to act as a bracket and the whole made a very neat and strong layout at a cost that would not equal that of new pipe of much smaller section if it had had to be purchased especially for this purpose.



By Adding Steps and Bracket, Old Steel Pole Is Utilized for Supporting Lights

Cleaning Motor Parts with an Alkali Bath

By O. A. Norene

Assistant Master Mechanic Omaha & Council Bluffs Street Railway

AN INEXPENSIVE way of thoroughly cleaning armature housings, armature and axle boxings, field coil flanges, spring pads, etc., is to immerse them in a solution of steam-heated industrial alkali cleaner. After remaining in this solution for from one and one-half to two hours the parts are removed and washed with a hose. Field flanges and spring pads, after being passed through the alkali bath, are dipped in insulating varnish and baked.

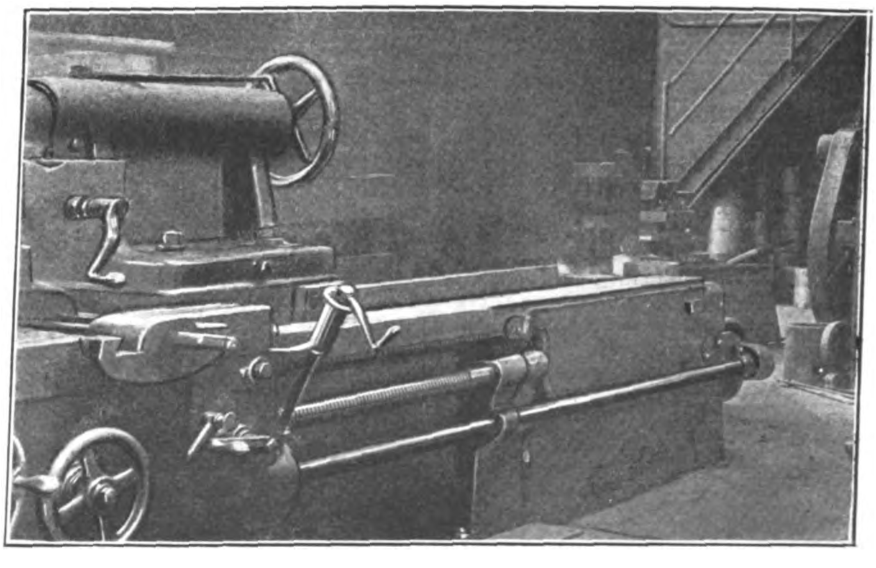
As we are not at the present time equipped in Omaha with large tanks and equipment for handling the heavier parts of motor frames, they are cleaned by compressed air, which removes the loose particles, and the balance is removed with a revolving steel brush operated by the use of a small air grinder motor. This does a much better and cleaner job than the use of gasoline and brush.

Lathe Bed Lengthened on Concrete Support

REQUIRING a few feet extra of bed length on a 36-in. lathe in the machine shop section of the Norfolk & Western repair shops at Bluestone Junction, W. Va., the foreman in charge adopted the unusual expedient shown in the accompanying illustration. Two steel plates, 1¾ in. thick, of the desired length, and of a width corresponding to that of the rails of the lathe bed, were bolted to substantial brackets mounted on the end of the lathe bed. A concrete block was then cast under the extension of the lathe bed, holding the rails firmly in place by means of countersunk anchor bolts in the concrete.

The motor controller, previously removed from the end of the lathe, was mounted on the outer end of the concrete block, the operating rod connecting it with the lathe carriage being lengthened accordingly.

This construction is called into service only occasionally, but it is substantial and serves its purpose.



The Norfolk & Western Railway Found This an Economical Method for Lengthening a Lathe Bed in the Bluestone Junction Shops

New Equipment Available

Small Size Air Motor Hoist

A NEW air motor hoist of small and compact construction is being marketed by the Ingersoll-Rand Company, New York, N. Y. The outstanding characteristics of the new size A hoist are compactness of design, resulting in low headroom and relatively light weight; an automatic brake, which holds the load under all circumstances, even if the air supply be disconnected or fail, and a graduated throttle which permits a very close regulation of both the lifting and the lowering speeds.

Air Motor Hoist

A balanced three-cylinder air motor is used which operates in either direction and without vibration at any speed or load within the rated capacity of the machine. The throttle graduation on this new hoist is very fine and insures instant and complete control of the hoist at any speed. A safety stop lever is provided which closes the throttle and stops the motor whenever the load is by chance raised to the top of the hoist lift.

The automatic brake is a new feature as it holds the load at any desired position for any length of time regardless of air pressure. The brake consists of a disk attached to the motor shaft and of a brake plunger with a friction face, which is held in contact with the disk by springs whenever the hoist is not operating, i.e., whenever the air supply to the motor is cut off either by throttling or otherwise. It is entirely automatic in its action and requires no attention from the operator.

The motor and gears are both inclosed. The motor operates in a bath of oil and the gears turn in a heavy grease. Oil passages lead to all bearings. Ball bearings or bronze bushings are provided at all points where experience has indicated that they will add to the efficiency or life of the hoist. If the hoist be overloaded, it is only necessary to remove the overload, after which the hoist will start up and work again.

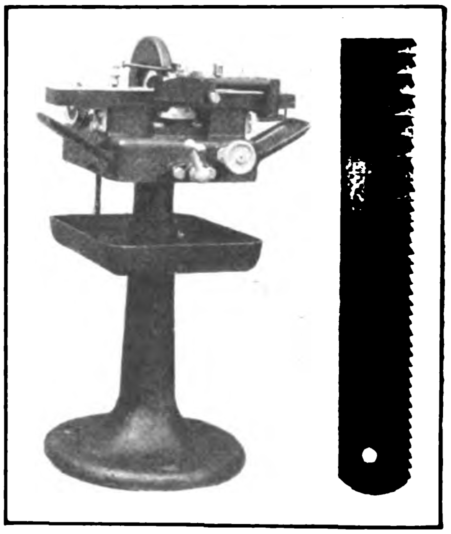
A roller bearing monorail trolley can be provided in place of the top hook if desired. The trolley mounting reduces the headroom necessary for installing and because of its rigidity enables an operator to start a loaded hoist along a runway without difficulty.

Development in Hack Saw Blades and Metal Cutting Machines

THREE new improvements in equipment for sawing metal have been placed on the market by Edward G. Herbert, Ltd., Manchester, England. These include a special hacksaw blade, a saw sharpening machine and a metal sawing machine. All are being marketed under the trade name of "Rapidor."

The saw blades are made of high speed steel containing 18 per cent tungsten, and are hardened in a special way to make them tough and durable. A special feature of the blade is a patent set, which extends beyond the root of the tooth. Blades can be sharpened until the original teeth have been entirely ground away and can be sharpened in any suitable grinding machine, but the manufacturers recommend using the new type "Rapidor" machine.

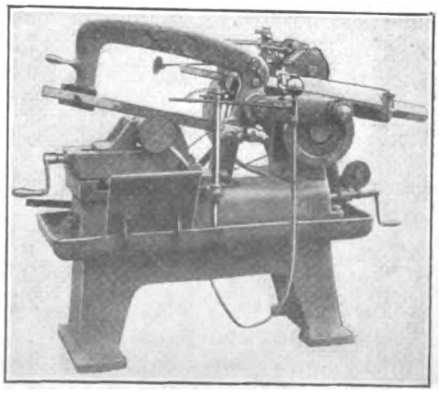
In a test made of this new hacksaw blade a 4-in. diameter mild steel bar was sawed in a machine making 170 strokes per minute. The quickest cut was made in four and three-quarter minutes and the longest cut in ten minutes, the average time being seven minutes per cut. A total of 367 cuts were made, the saw being sharpened nine times during the test.



Left—Machine for Sharpening Hacksaw Blades. Right—New Type Hacksaw Blade

The Rapidor sharpening machine provides a new method of sharpening hacksaw blades, which consists of grinding them exactly to models having the correct shape of teeth for quick cutting. The grinding wheel is stationary and the blade moves toward the wheel in contact with the model. Teeth are ground on both faces and the machine will sharpen any size or make of hacksaw blade.

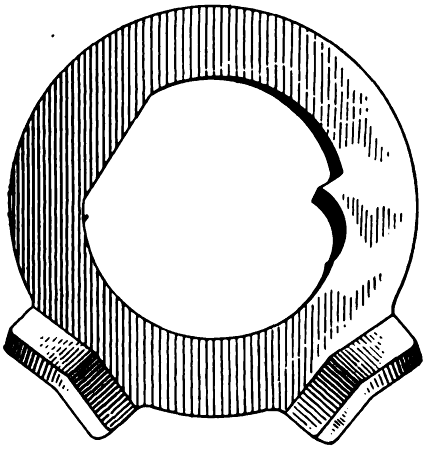
The third development is in a new type of sawing machine. These are made in two sizes, one with a capacity of 6-in. rounds or squares and the other having a capacity up to 10 in. rounds and other sections to 12 in. x 18 in. The saw holders have an indicator to show when the blade is strained sufficiently. This prevents breakage of blades through incorrect tension. A dashpot is fitted with a device which enables a start to be made on a sharp corner or square bar without danger of breaking the teeth of the saw.



High Speed Sawing Machine

Safety Nut Lock for Rail Joints

A NEW type of nut lock which has been given the name of "Bull Dog" has been placed on the electric railway market by the Waynesboro Nut Lock Company, Waynesboro, Pa. This nut lock has two projecting lugs on the outside circumference and a dog projection on the inside.



New Type of Nut Lock

As the nut is screwed down on the bolt, a corner of the nut comes between the lugs. Four different angles are provided on the faces of the lugs, and as the nut is screwed into place the washer turns up, so that the lugs do not need to be bent over in order to hold the nut.

The lock operates on the principle of an alligator wrench. The nut can be tightened but not unscrewed as the dog engages the metal and the greater the force applied the deeper will be the grip of the dog. In order to remove the nut, the lugs are knocked off by a cold chisel or screw driver.

Oil Burner for Car Heating

A SELF-GENERATING oil burner for installation in stoves now used for hot air and hot water heating systems in passenger cars is being marketed by the Chausse Oil Burner Company, Detroit, Mich. A number of equipments have already been completed and installed on electric railway cars for a period of testing.

A collar is furnished to go between the door and the firepot of the ordinary stove. This makes the door about ½ in. further away than usual from the firepot and gives room for pipe to be run into the stove. Under the body of the car a 30-gal. high-pressure oil tank is installed. This size tank is sufficient for about thirty hours continuous service, and from 5 to 20 lb. air pressure is required to force the oil up through the piping to the burner in the car. Air pressure is obtained from the ordinary compressor tank through a reducing valve, but in case of compressor failure enough pressure will remain in the tank to operate the heater for several hours.

The oil is forced up through a series of pipes to the gas-generating burner in the stove. To light the burner it is necessary only to open a valve and throw a piece of burning newspaper into the fire pot. A feature of this system is that the regulating valve is not on the fuel pipe, but on the gas pipe. This makes it possible for the burner to be turned down in mild weather without causing carbonization. Distillate or furnace oil is ordinarily used, but old transformer oil, crankcase and compressor drainings or kerosene may be used.

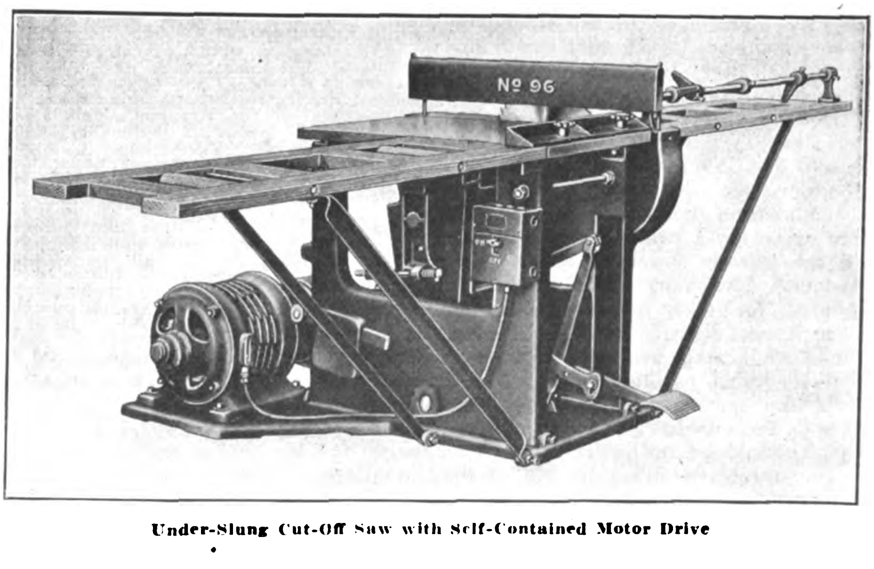
An important item is the safety valve to extinguish the flame instantly in case of collision, derailment or overturning of the car. It operates also in case the car catches on fire. This valve, however, is not affected by ordinary coupling shock. In case the fire in the burner goes out, a valve automatically shuts off the flow of oil, which will not commence again until the burner is lighted.

In one recent test the burner is said to have raised the temperature of a cold car to 76 deg. F. in twenty-one minutes. The complete outfit, without fuel, weighs 70 lb., of which 45 lb. is in the tank and 25 lb. in the burner and safety devices.

High-Speed Under-Swing Cut-Off Saw

THE general method of mounting cut-off saws is to suspend them either from the wall or ceiling. A radical departure from this is now being marketed by the Oliver Machinery Company, Grand Rapids, Mich., in its new No. 96 high-speed under-swing cut-off saw. This saw is of the under-slung type and is made for either belt or motor drive. By pressing a foot treadle the saw is brought forward to cut up 2-in. material up to 22 in. wide or 4-in. up to 16 in. wide. The saw returns by releasing the pressure on the treadle. A spring is used in connection with the foot treadle to give a quick return and insure rapid operation.

The saw is guarded by an adjustable guard and has an inclosed sawdust chute. The main part of the table is cast iron, 22 in. x 36 in. and is 33 in. high. Two auxiliary tables or extensions are furnished, fitted with two rollers each, and the right hand section is fitted with a positive stop gage with three adjustable stops. The forward and back stroke of the saw arbor is adjustable for short or long strokes and the spring mechanism prevents jerking and jarring on both the forward and return adjustment of the saw.



Under-Slung Cut-Off Saw with Self-Contained Motor Drive

For belt drive a countershaft is furnished and for motor drive an extended sole plate in place of the countershaft. The saw arbor itself can be locked in a stationary position, so that it can be used as a rip saw, and by using the miter gage it can be made to serve like the ordinary stationary arbor cut-off saw for cross-cutting work.

The News of the Industry

One-Man Operation Attacked

City of Oakland Repudiates Previous Action and Seeks to Coerce Local Railway

The city of Oakland, Cal., through its elected officials, is up in arms against the San Francisco-Oakland Terminal Railways. There is no doubt that most of the moves made against the railway are political in character, but they have nevertheless had the effect of embarrassing the company. The railway has been made the butt in disputes over service, fares and one-man cars. As a matter of fact, however, the one-man car has been singled out by the city as most vulnerable for attack. Accordingly the one-man cars have been banned, as was indicated in the ELECTRIC RAILWAY JOURNAL for Oct. 20, page 722, the city would do.

On its part, the railway has refused to comply with the order and continues to operate this type of equipment. In fact, the company has challenged the city with respect to its authority in this matter, jurisdiction over the operation of the railway having been transferred to the State Railroad Commission in 1914.

It had been anticipated that perhaps the city would seek to use its police power to enforce its one-man car order, but instead it retaliated by literally declaring war on the railway. The city started at once to negotiate with the Peerless Stage Company for a franchised bus service, indicated that it would revoke the jitney prohibitory ordinance and then purchased and put into operation a twenty-nine-passenger Fageol safety coach on Telegraph Avenue. Two more buses have been ordered for early delivery, and the Council has declared that as soon as funds can be made available more buses will be added paralleling the railway lines and serving new districts. The fare on the city bus is 1 cent less than that charged by the railway.

The railway is telling its side of the controversy to the public through the *Key Route News* and in large newspaper space. The company says that the Railroad Commission after receiving a favorable report on the one-man safety cars from W. J. Handford, its service inspector, recommended on Aug. 13, 1918, the purchase of twenty-five Birney one-man safety cars as a matter of economy in the company's operations. At that time there was an ordinance which prohibited the operation of cars by one man, but the company, desiring to act upon the recommendation of the Railroad Commission, presented the entire matter to the City Council, indicating that it contemplated the purchase of twenty-five Birney one-man safety cars. As a result the ordinance which prohibited operation of cars by one man was repealed. This was in the fall of 1918. Among those who voted favorably on the repeal measure when it was before the Council was the present Mayor, Mr. Davis.

The railway, with the approval of the Railroad Commission and the consent of the City Council, proceeded to purchase the cars at a cost of $168,445. This purchase and its financing were approved by the Railroad Commission on June 7, 1920. These are the cars against which protest is now made. As the company explains:

> These cars were put in service in August, 1920, and have been operated more than 2,600,000 miles and have carried more than 13,700,000 passengers, in safety, without protest or complaint, until, politically, they were claimed to be unsafe, by the passage of the last ordinance, a few days ago.

In a subsequent statement the company said:

> From what we have said it sufficiently appears that the company has made investments approaching $1,000,000 in cars of this character. It has operated cars of this type upon the streets of Oakland for more than three years without protest or opposition. This has been done with the consent and approval of the Railroad Commission of the State of California, to which the citizens of Oakland surrendered the powers to consider and act upon such matters. The company cannot surrender the right to operate this equipment, thereby submitting to the confiscation of this property, without a judicial determination of the question whether its operation is to be carried on in accord with the regulations and subject to the approval of the Railroad Commission of the State of California, or the City Council of the city of Oakland.
>
> Our company cannot operate under two masters. The law vests jurisdiction in one or the other. The question is: Which?
>
> All parties in interest will be benefited by the determination of this question, and until such determination is had, the company must insist upon its right to continue to operate as heretofore.

With its case thus presented the company explains that it leaves with the public for decision the question of which side to the controversy has acted in good faith.

Although strong appeal had been made for the repeal of the ordinance prohibiting the operation of jitneys the latest advices indicate that the Council has rejected by a vote of three to two the idea of giving the jitneys free rein again.

In the heat of the controversy over the question of the operation of one-man cars, the matter of service and fares has been relegated to the background for the time being, although the fare matter has come up incidentally at the recent hearings in connection with the proceedings before the Railroad Commission looking toward approval by that body of the recently submitted financial reorganization plan.

$36,874,951 Traction Fund

Chicago Re-establishes Relations With Railways, Broken When Thompson Was Mayor

Chicago's traction fund now totals $36,874,951. It was increased to this amount on Oct. 20, when city officials accepted checks totaling $8,189,158 from the railway officials.

Acceptance of this sum, the city's 55 per cent of the net receipts of the railways for four years, was the last step in Mayor Dever's re-establishment of relations with the traction companies which were broken off during former Mayor Thompson's administration.

The checks offered and accepted by the city were the same tendered to and refused by former Mayor Thompson, who had caused the franchise of the Chicago Surface Lines to be canceled by the City Council and who feared that acceptance of the money would prejudice suits pending in the courts to enforce the cancellation. The Chicago City Railway paid $2,809,379, while the Chicago Railways turned over $5,379,758. These two companies are comprised in the Chicago Surface Lines.

Fourteen checks in all were accepted by City Comptroller Martin J. O'Brien. They represented the city's share of the companies' profits payable each year from 1920. The dates and amounts of each check follow:

From the Chicago City Railway:

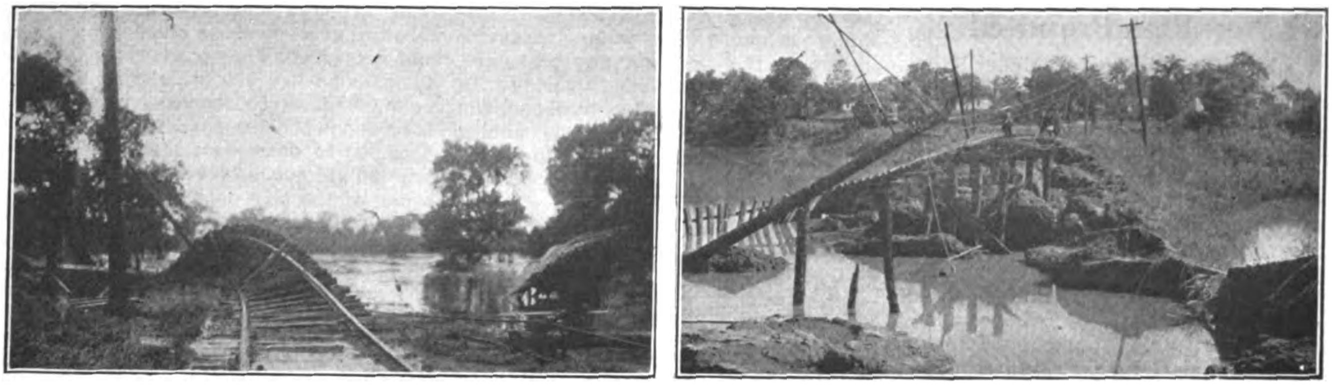
April 10, 1920	$442,991
April 9, 1921	737,989
April 10, 1922	685,373
April 10, 1922	390,372
April 10, 1923	276,327
April 10, 1923	276,327
Total	$2,809,379

From the Chicago Railways:

April 9, 1920	$1,004,372
April 9, 1921	706,626
April 9, 1921	700,000
April 10, 1922	858,367
April 10, 1922	500,000
April 10, 1922	500,000
April 10, 1923	610,393
April 10, 1923	500,000
Total	$5,379,758

Whether the city is entitled to interest on the funds which were held in trust by the companies after the former administration's refusal to accept the checks may still be the subject of controversy. The traction fund was created for subway construction by the terms of the 1907 franchise ordinances under which the companies operate.

The forfeiture suits filed against the railways during the administration of former Mayor Thompson have been dismissed on the motion of Corporation Counsel Busch.



Oklahoma Road Damaged

Canadian River on Rampage Washes Out Track of Interurban—Water Unusually High

Heavy losses to track and roadway were sustained during October by the Oklahoma Railway due to the flood waters of the north fork of the Canadian River. On the morning of Oct. 15 water covered a mile of track on the El Reno Division just east of Banner, Okla., and all through traffic between Oklahoma City and El Reno was discontinued. On the evening of Oct. 15 the flood again struck the El Reno Division and took out 280 ft. of trestle and 100 ft. of dump at the crossing of the Canadian near stop 17. This same rising of the river washed 1,500 ft. of track off the fill near stop 20 and cut out 500 ft. of fill to a maximum depth of 18 ft. at stop 21. The crest of the flood reached Oklahoma City early in the morning of Oct. 16, bringing with it the water loosed by the cutting away of the core wall at the City Reservoir, 8 miles west of the city. The river reached a stage of 22.5 ft., which was 6.2 ft. higher than the record set by the flood of June, 1923.

The Stock Yards line was under water for a distance of ¾ of a mile and badly washed out. The Walker Street line used jointly for city and Norman Division traffic was washed out, 380 ft. of trestle and 1,400 ft. of dump being taken. The Central Avenue Line was under water for ¾ of a mile, track lined off the dump, 140 ft. of trestle washed out and heavy cutting made at various places.

Traffic between Oklahoma City and El Reno was resumed on Oct. 20 after a ferry had been installed at the river crossing at stop 17, the track at stop 20 replaced, a shoo fly constructed around the washout at stop 21, and high-line trolley and feeder line restored. While the tracks on Exchange Avenue were still under water, gangs were put to work, the outbound track was raised on sand bags and light cars were operated on Oct. 21. Traffic between the north and south part of the city was shut down six days. Due to the river changing its course, on South Walker Street and Central Avenue Line, additional trestles will be necessary before traffic can be restored on these two lines. A total of 800 ft. of trestle and approximately 1 mile of track will have to be rebuilt there.

Gerard Swope to Give First Aldred Lecture

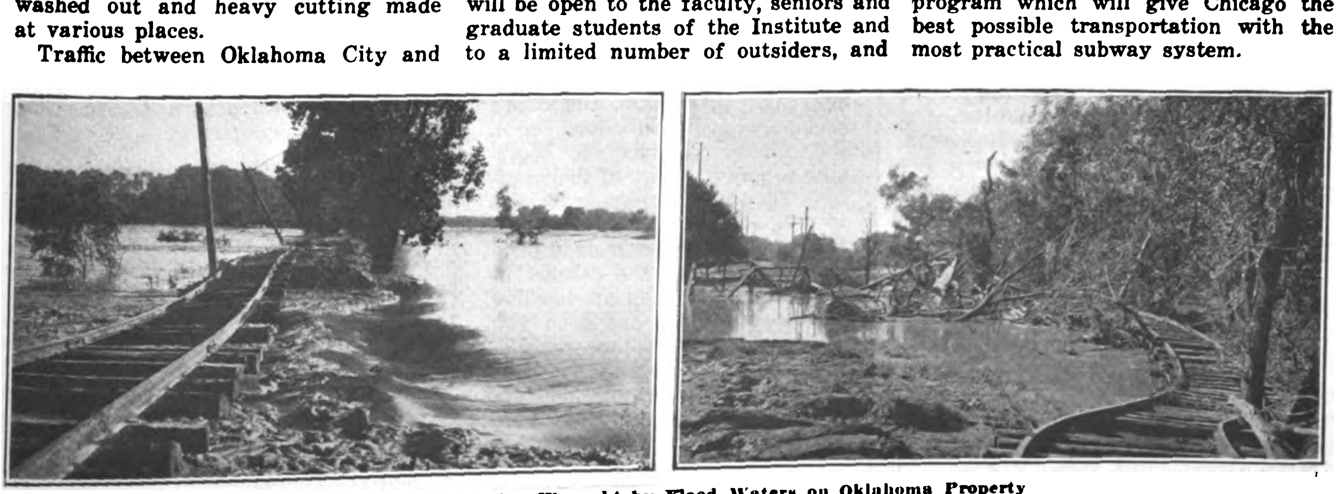
Gerard Swope, president of the General Electric Company, has accepted the appointment of first Aldred lecturer at the Massachusetts Institute of Technology, Cambridge. The opening day of the course is Nov. 9. These lectures have been established by J. E. Aldred of Baltimore, who has been responsible for similar lectures bringing leaders in science and industry into other educational curricula, thus tying the interests of engineering students more closely into those of the business world. Other eminent industrialists and engineers are to complete the Cambridge program for the first year, which will consist of twelve lectures. This year's lectures will be open to the faculty, seniors and graduate students of the Institute and to a limited number of outsiders, and will probably be published for general distribution next spring. President Stratton has appointed Prof. D. C. Jackson. head of the department of electrical engineering, and Prof. V. Bush, in charge of graduate work in electrical engineering, to co-operate with Mr. Aldred in this work.

Subway Program Promised by Chicago Mayor

Mayor Dever of Chicago has announced that a committee of experts is making a study of a plan to begin construction of subways soon without waiting the outcome of negotiations for municipal ownership of the local transportation systems. In explaining his position, Mayor Dever said:

> I have never said that subways would have to await a solution of the surface and elevated lines question. Subways will be an integral part of any solution of the transportation problem and as such are now being considered by my advisory staff in its study of plans for the unification of transportation facilities.
>
> A subway system and a comprehensive subway system are two different things. We have enough money in the traction fund, or will have when the Surface Lines' $8,000,000 is added, bringing the total to approximately $40,000,000, to build all the subways necessary for Chicago.
>
> If the only question involved was a financial one we could being tomorrow to dig subways and build 20 miles of rapid transit lines with the money in hand. But other problems enter into any discussion of the subway question. For instance, it must be determined what we will do with the subways when built. Shall the city operate them or would it be well to lease them to private enterprise? And, if they are leased to an operating company, would it be possible for it to guarantee the city against loss and still maintain a low, reasonable fare?

The Mayor has promised as soon as a conclusion is reached to announce a program which will give Chicago the best possible transportation with the most practical subway system.



Havoc and Destruction Wrought by Flood Waters on Oklahoma Property

New Plan Promised

Five-Cent Fare Inadequate Under Existing Conditions in Jersey—Modified Settlement Plan Coming

Within a short time the Public Service Railway of New Jersey will offer a modified plan for the settlement of the present transportation problem there, free from the objections that were raised to the former plan. Announcement to this effect was made by President T. N. McCarter of the company on Nov. 1. Mr. McCarter said that a month's trial of the 5-cent fare in local areas in the more important municipalities has shown that under existing conditions the 5-cent rate will not produce "the cost of service." His statement follows:

> The experimental 5-cent rate of fare adopted by Public Service Railway at the suggestion of the Board of Public Utility Commissioners has now been in effect in the populous centers of the state for one month. The public, generally, has shown an appreciation of the 5-cent fare plan and a desire that it be made permanent. The results, however, indicate that this will be impossible if the street railway and the buses continue to operate in competition with each other. The number of passengers on the street cars has increased, but not in sufficient numbers to make up for the reduction in fate. Consequently the rate is not producing the revenue received from the former rate before the cessation of service and is not providing the cost of service.
>
> Co-ordination of street railway and bus service under one management with proper state and municipal supervision will furnish the only possible solution of the transportation problem. Such a plan will end uneconomic and wasteful congestion and provide the only hope for the continuance of the 5-cent fare on both cars and buses. The present situation cannot be indefinitely continued.
>
> The railway will undertake to furnish such a co-ordinated railway and bus service and will operate both cars and buses to the extent found necessary to accommodate the traffic. If this requires the acquisition of the buses now legally operating the company is prepared to act. Within a short time the company will offer a modified plan, free from objections that were raised to its former plan, to accomplish the result so necessary for the public convenience. To bring such a plan to a successful consummation will require the active co-operation and assistance of the state and municipal authorities.

The original plan of settlement for the transportation difficulties was suggested by President McCarter on Aug. 21. Very briefly, the company offered to take over competing buses at their then existing physical value and run a co-ordinated bus and car service at a 7-cent fare. City officials opposed increasing the bus fare to 7 cents, as would be done under the Public Service plan. The trolleys continued idle until the chancellor ordered the company to restore operation at the 8-cent rate. At about the same time the cars started, the Public Service filed with the Public Utilities Commission a 10-cent fare schedule. The commission suggested to the company that it try a 5-cent rate within city limits. After deliberation the company announced that it would give the plan a four-month trial beginning on Oct. 1.

New Proposition Submitted.—In accordance with votes recorded by the carmen's unions recently a new proposition has been submitted to the Worcester Consolidated Street Railway and the Springfield Street Railway. It includes demands for wage increases, change to the day rate pay basis and changes in working conditions, all to take effect on Jan. 1. Details of the demands have not been made public, but public conferences will be arranged soon.

Conditions Can't Continue in Youngstown

"A continued deficit in this fund without probability of payment from operating receipts would naturally result in the discontinuance of the street railway service, unless some other means may be found by the city or company of working out the original plan." This is the finding of a special legal committee appointed by the legislative committee of the Chamber of Commerce of Youngstown, Ohio, to make an investigation into the financial condition of the Youngstown Municipal Railway. The abstract of the service-at-cost plan which was in preparation for several months by the committee was submitted and approved at a meeting of the legislative committee. It will be used by the latter committee in the preparation of an exhaustive report on the transportation situation.

The findings refer to the ordinance which gives the company the right to operate under a guarantee on behalf of the city to charge a rate of fare which will earn sufficient revenue to pay the operating allowance and maintenance, repairs and renewals. The report states that this amounts at the present time to 25 cents per car-mile for operating allowance and 7.83 cents for maintenance, repairs and renewals. In addition the gross revenue should pay taxes and a return. The company is further permitted when the stabilizing fund is below $50,000 to increase its rate of fare and when the fund is increased to $150,000 to decrease its fare. The report points out, however, that the guarantee of the city does not impose upon it an obligation that at the rate of fare charged the gross income will be sufficient to pay the stipulated return on its capital value or in fact even to pay the operating cost. Further, the city merely contracts and agrees that the company may operate on this plan, and that in case the stabilizing fund should be found insufficient then the preservation of the stabilizing fund would be purely a company matter.

From the fact that there now exists in the stabilizing fund a deficit of $900,000, it would appear that results under the rates charged have not accorded with the original purpose of the ordinance which was to earn enough from operation to preserve the service at cost without permanently depleting the stabilizing fund.

Kewanee Pays the Price of Neglect

RESIDENTS of Galva and Kewanee, Ill., are paying the price of their neglect of the Galesburg & Kewanee Electric Railway. Like many other humans they didn't recognize a good thing when they had it. Closeness to the object destroyed their sense of appreciation. And so the electric railway, after making a vain fight to keep going, quit and then sold out. The second-hand man has the road now. His husky disciples of destruction are expected to begin their work of demolition most any day. In a sense, the road's problems have been solved for it. But former patrons are beginning to pay the price of their neglect. They are now paying 76 cents to ride one way by bus between Galva and Kewanee instead of 36 cents charged on the defunct interurban. And they are howling. Although service has been shut down only a short time petitions are being circulated beseeching the local Chambers of Commerce to see what they can do about having the service restored.

Improves Service.—The Eastern Wisconsin Electric Company has practically doubled its service accommodations for patrons between Sheboygan and Plymouth.

Truth About Utilities.—The American Development Publicity Association recently published a series of articles in the New York *Evening Mail* on the truth about public utilities.

Wants Statement Corrected.—W. E. Wood, manager of the Houston Electric Company, wishes to correct a statement of John A. Beeler which appeared in the Sept. 22 issue of the ELECTRIC RAILWAY JOURNAL to the effect that the average speed for cars in Houston was 6 m.p.h. Mr. Wood says the correct figure is 9 m.p.h. and has been for some time.

Asks to Remove Tracks.—The Philadelphia Rapid Transit Company has petitioned the commissioners for permission to remove tracks and wires from Christian Street between Sixth and Eighth and from Filbert between Eighth and Ninth. The removal is requested to permit new paving of the streets. An ordinance recently passed by the City Council providing for the removal contains also a clause providing for the relaying of the tracks in the future, if found necessary.

Richmond Committee Ready to Proceed.—Petitions are before the committee on streets of the City Council of Richmond, Va., from practically every civic and commercial organization in the city, asking the committee to proceed with the consideration of the proposed new blanket franchise for the Virginia Railway & Power Company. According to the chairman, the committee is ready to do this, "provided other matters are not injected into the deliberations of the committee by citizens themselves."

Financial and Corporate

$938,467 Earned by Detroit Municipal

The gross revenue of the Department of Street Railways of the City of Detroit for the fiscal year ended June 30, 1923, was $20,196,163 and the operating expenses exclusive of taxes were $14,450,613, leaving a net revenue of $5,745,550. As the charter specifies that taxes shall be levied on the physical property of the entire system the same as though privately owned, a deduction of $639,745 was made for this purpose, leaving an operating income of $5,105,805, which was augmented by non-operating income to $5,178,707. Interest, sinking fund and amortization payments reduced this gross income to $938,467 which was transferred to the profit and loss account. These figures, shown in an accompanying table, are all contained in the department's first annual report, just issued.

The deficit of $2,369 in motor bus operations is stated to be due to the payment of $600 per month rental on the two buses, which however may be applied on the purchase price.

The status of the city's investment is shown in the balance sheet, reproduced herewith. The city has spent over $15,000,000 in new construction and over $21,000,000 represents the property secured from the Detroit United Railways. Against a total of $38,307,785 investment in the property obligations to a total of $34,419,304 are outstanding, of which $15,880,000 represents the outstanding amount of the D. U. R. purchase contract, which has been reduced by payments which will retire the debt by Dec. 31, 1931.

The city is now operating 373 miles of single track and 1,673 passenger cars, of which 1,603 are owned and seventy leased. Of the total 1,171 are two-man motor cars, 252 trailers and 250 one-man. The average number of cars in the shop for repairs, painting and cleaning is 140.

The city operated 49,334,286 revenue passenger car-miles and 86,916 non-

DETROIT DEPARTMENT OF STREET RAILWAYS
CONDENSED INCOME STATEMENT FOR THE FISCAL YEAR ENDED JUNE 30, 1923

Revenue from transportation:		
Passenger revenue	$19,080,465	
Parlor chair and special car revenue	1,817	
		$19,082,282
Revenue from other railway operations:		
Rent of tracks and facilities	$968,657	
Other transportation revenue	145,224	
		1,113,881
Total operating revenue		$20,196,163
Operating expenses:		
Ways and structures	$1,967,576	
Equipment	1,258,988	
Power	2,061,595	
Conducting transportation	7,641,196	
Traffic	1,841	
General and miscellaneous	1,519,417	
Total operating expenses		14,450,613
Net revenue from railway operations		$5,745,550
Deduct taxes assignable to railway:		
Operations	$633,797	
Miscellaneous rents	5,948	
		639,745
Operating income		$5,105,805
Non-operating income:		
Net income from miscellaneous property (rent)	$15,194	
Income from unfunded securities and accounts	52,616	
Income from sinking fund and reserves	5,092	
		72,902
Gross income		$5,178,707
Deductions:		
Interest on bonds and notes	$1,856,496	
Sinking funds on bonds and purchase contract	2,381,294	
Amortization of discount on funded debt	2,450	
Total deduction from gross income		4,240,240
Net income		$938,467
Ratio operating expenses to revenue from transportation		0 7573
Ratio operating expenses to total operating revenue		0 7155
Ratio net income to operating revenue		0 0465

INCOME STATEMENT OF MOTOR BUS OPERATION FOR 7½ MONTHS ENDED JUNE 30, 1923

Revenue from operation		$10,942
Expenses:		
Wages of operators	$5,762	
Other expenses	7,549	
		13,311
Net loss		$2,369

CONDENSED YEARLY PAYROLL SUMMARY

Executive	$75,300
General office	27,208
Claims	64,286
Employment	6,346
Intelligence bureau	24,035
Auditing	123,649
Transportation	6,691,037
Tracks	1,160,257
Electrical	561,263
Equipment	1,254,839
Supplies	607,903
Building construction	256,849
Total	$10,852,972

DETROIT DEPARTMENT OF STREET RAILWAYS
CONDENSED BALANCE SHEET—JUNE 30, 1923

Assets

Road and equipment:		
Ways and structures	$15,618,137	
Ways and structures purchased from D.U.R (day-to-day lines)	1,605,000	
Ways and structures secured from D.U.R. on purchase contract	19,850,000	
Investments:		
D.S.R. purchase sinking fund and interest reserve account	377,598	
D.S.R. purchase sinking fund and interest reserve account and purchase fund, City of Detroit special assessment bonds	857,050	
Total investment		$38,307,785
Current assets:		
Cash, construction fund	$260,586	
Cash, operation and maintenance fund	385,294	
Cash, purchase fund	560	
Cash, additions and betterments fund	20,895	
Accounts receivable	305,194	
Accrued accounts receivable	1,104,179	
Material, supplies, and uninstalled machinery and equipment	1,882,880	
Interest, dividends, and rents receivable	1,000	
Miscellaneous funds	92,774	
		4,053,362
Unadjusted debits:		
Accrued sinking fund, construction period	233,368	
Prepaid operating expense	5,000	
Prepaid insurance	198,880	
Prepaid taxes	24,684	
		462,932
Total assets		$42,824,079

Liabilities

Long term obligations:		
Construction bonds	$15,000,000	
Less: payment to city sinking fund commission to retire bonds at maturity	416,191	
		14,583,809
Purchase bonds	$4,000,000	
Less: payment to city sinking fund commission to retire bonds at maturity	44,505	
		3,955,495
Additions and betterments bonds	$5,000,000	
Less: bonds authorized unissued	5,000,000	
D.U.R. purchase contract		15,880,000
		$34,419,304
Debt retirements from operation:		
Construction and purchase bonds	$290,071	
Paid D.U.R. on purchase contract	1,200,000	
		$1,490,071
Current liabilities:		
Notes and accounts payable	$883,385	
Inventory of material and supplies and uninstalled machinery purchased from D.U.R	975,000	
Accrued accounts payable	242,728	
Accrued wages payable	524,422	
Miscellaneous current liabilities	17,746	
		2,643,281
Unadjusted credits:		
City interest fund, construction bonds	276,695	
City sinking fund, construction bonds	233,368	
		510,063
Reserves:		
Injuries and damages	$566,047	
Sinking fund and interest payments	1,486,220	
		2,052,267
Surplus:		
Balance as of June 30, 1922	$510,318	
Net profit for fiscal year ending June 30, 1923	1,198,775	
		1,709,093
Total liabilities		$42,824,079

revenue, making a total of 49,421,202. The passengers carried totaled 471,070,493, of which 357,386,437 were revenue and 113,684,056 transfer.

The total number of employees on the payroll was 6,525. A summary of the payroll is given by departments in an accompanying table which is condensed from that given in the report.

Regarding depreciation, the report states:

> A depreciation charge, as such, was not made during the year, but the gross income was reduced by sinking fund charges which it is believed were larger than any reasonable estimated basis for depreciation, with the result that the net income as here shown affords a proper and accurate basis of comparison with the reports of privately operated utilities.

Considerable attention is given in the report to ways and means for speeding up street car passenger travel in the city of Detroit. By actual riding and timing it takes, during the evening rush hour, from fifteen to eighteen minutes to travel 1 mile in the central business area. It is imperative, states the report, that street car service in this district be placed underground in surface car dips at the earliest possible date.

The "Journal's" Analysis of the Detroit Figures

High Traffic Density a Major Factor in Success of Department of Street Railways—Low Taxes and Interest Rates and Assistance of Other City Departments Also Help to Make a Favorable Showing

THE interest that exists in the railway field regarding the operation of the street railway system of Detroit by the municipality has prompted the ELECTRIC RAILWAY JOURNAL to make a hurried analysis of the figures submitted in the first annual report of the Department of Street Railways, City of Detroit, just issued for the year ended June 30, 1923, as shown on the preceding pages.

Several factors stand out as contributing materially to the measure of success that has been attained. There has been a remarkable increase in population. This, in the absence of any important extensions of track for several years, has resulted in an exceedingly high traffic density—a most favorable situation for the railway. Taxes charged against the railway are much lower in proportion to earnings than for private companies. The street railway department receives favorable treatment as compared with the private company in the matters of paving and rate of interest, and obtains the services of the city legal, purchasing and accounting departments for a large amount of work normally charged against the car rider instead of the taxpayer.

On the factor of growth in population, it may be noted that prior to the acquisition of the car lines in the city by the Department of Street Railways, the Detroit United Railway operated an extensive system, comprising interurban lines extending across Michigan and into Ohio, in addition to the city lines. For 1921, the last year of full operation, the total gross earnings of the entire D.U.R. system were $23,329,067, or only 22 per cent in excess of the revenue of the department for the city lines in Detroit alone in the fiscal year ended June 30, 1923.

POPULATION GROWTH IN DETROIT REMARKABLE

This remarkable growth is due to favorable industrial conditions in the Detroit area which have made the city the fourth in size in the United States and have resulted in a great amount of added street car riding along with the increase in population. This growth in business has not been met with a corresponding increase in track mileage, although a program has been laid out by the city that will increase the trackage materially. The result is that the rate of earning on the existing permanent investment is much higher than the average for street railways in the United States. This is indicated in Table I, which gives a comparison between the Detroit figures and corresponding figures for 121 privately owned urban electric railways reporting to the American Electric Railway Association. The operating revenue per mile of track in Detroit is at the rate of $54 145, as compared with $28,310 for these roads, or more than 90 per cent above the average.

The density of street car travel is indicated by the number of revenue passengers per car-mile, which is 7.2, as compared with 6.6 for the 121 railways. The total passengers per car-mile is 9.5, as compared with 8.4 for the 121 roads. These two ratios average about 10 per cent higher for Detroit. This explains why, with an average fare of 5⅓ cents, as against 6.7 cents for the other roads, the passenger revenue per car-mile for Detroit was 40.8 cents, as compared with 44.6

OPERATING EXPENSES IN DETAIL OF DETROIT MUNICIPAL RAILWAY FOR THE FISCAL YEAR ENDED JUNE 30, 1923

Group I—Way and Strcutures			
1	Superintendence of way and structures	$156,973	
2	Ballast	55,672	
3	Ties	17,835	
4	Rails	14,146	
5	Rail fastenings and joints	27,011	
6	Special work	209.042	
8	Track and roadway labor	572,261	
9	Miscellaneous track and roadway expenses	99,888	
10	Paving	224,022	
11	Cleaning and sanding track	73,219	
12	Removal of snow and ice	59,490	
16	Crossings, fences and signs	7,813	
17	Signal and interlocking apparatus	9,839	
18	Telephone and telegraph lines	771	
19	Miscellaneous way expenses	12,967	
20	Poles and fixtures	33,139	
22	Distribution system	134,722	
23	Miscellaneous electric line expenses	89,380	
24	Buildings, fixtures and grounds	130,386	
28	Equalization—Way and structures	39,000	
	Total		$1,967,576
Group II—Equipment			
29	Superintendence of equipment	$63,245	
30	Passenger and combination cars	734,443	
32	Service equipment	17,244	
33	Electric equipment of cars	281,400	
36	Shop equipment	43,396	
37	Shop expenses	67,876	
38	Vehicles and horses	6,316	
39	Miscellaneous equipment expenses	68	
44	Equalization—equipment	45,000	
	Total		$1,258,988
Group III—Power			
45	Superintendence of power	$29,531	
46	Power plant buildings, fixtures and grounds	10,177	
47	Power plant equipment	72,798	
48	Substation equipment	16,282	
49	Transmission system	282	
52	Power plant employees	147,803	
53	Fuel for power	539,021	
55	Lubricants for power	8,253	
56	Miscellaneous power plant supplies and expenses	8,595	
57	Substation employees	16,467	
58	Substation supplies and expenses	1,919	
59	Power purchased	1,210,466	
	Total		$2,061,594
Group IV—Conducting Transportation			
63	Superintendence of transportation	$279,620	
64	Passenger conductors, motormen and trainmen	6,064,111	
66	Miscellaneous car-service employes	65,939	
67	Miscellaneous car-service expenses	263,839	
69	Station expenses	28	
70	Carhouse employees	856,362	
71	Carhouse expenses	37,253	
72	Operation of signal and interlocking apparatus	39,886	
73	Operation of telephone and telegraph lines	9,469	
76	Freight and express collection and delivery	154	
78	Other transportation expenses	24,534	
	Total		7,641,195
Group V—Traffic			
80	Advertising	$1,842	
	Total		1,842
Group VI—General and Miscellaneous			
83	Salaries and expenses of general officers	$36,542	
84	Salaries and expenses of general office clerks	152,491	
85	General office supplies and expenses	54,304	
86	Law expenses	1,119	
89	Miscellaneous general expenses	24,217	
92	Injuries and damages	684,693	
93	Insurance	48,522	
94	Stationery and printing	88,444	
95	Stores expense	280,632	
96	Garage and stable expenses	60,670	
97	Rent of tracks and facilities	66,901	
98	Rent of equipment	20,882	
	Total		1,519,417
	Grand Total		$14,450,612

cents. While the base fare was 5 cents in Detroit during the period, an additional cent was charged for a transfer. This charge brought in a material added revenue and offset to some extent the lower base fare.

ANALYSIS OF OPERATING COSTS

A comparison of the operations for Detroit with those of the other companies has been worked out on the basis of per cent of gross in Table II. It shows some striking differences. The operating ratio is almost the same for the two, being 71.6 per cent for Detroit as compared with 71.7 per cent for the others. The distribution of the operating costs is quite different, however. In Detroit less was spent proportionally for all items except transportation, which was 6.4 per cent higher. The way and structures expenditures were not materially different in the two cases, although Detroit must have been relieved of a considerable amount of the paving burden, judging by the fact that only $224,022 was spent on this item with 373 miles of track. To offset this, a considerable amount of track in the system taken over from the D.U.R. was in bad condition and has needed excessive repairs. Expenditures for equipment are considerably lower for Detroit, probably due to the large number of new cars that have been placed in service within the year, and on which repairs should be light. Power cost is slightly less in Detroit than for the average. The streets are fairly level, stops are well spaced out, and a large number of trailers and safety cars are in use.

TABLE I—OPERATING STATISTICS OF 121 PRIVATE URBAN ELECTRIC RAILWAYS FOR CALENDAR YEAR 1922 COMPARED WITH DETROIT FOR FISCAL YEAR ENDED JUNE 30, 1923.

	121 Railways	Detroit
Railway operating revenue per mile of single track	$28,310	$54,145
Passenger revenue per mile of single track	$27,593	$51,154
Passenger revenue per car-mile, cents	44.6	40.8
Revenue passengers per mile of single-track	408,968	958,140
Revenue passenger per car-mile	6.6	7.2
Total passengers per mile of single track	522,078	1,262,923
Total passengers per car-mile	8.4	9.5
Transfer passengers, per cent of revenue passengers	26.5	31.8
Car miles per mile of single track	61,828	132,496

The general and miscellaneous expenditures are materially lower in Detroit, being 7.5 cents as compared with 9.4 cents for the 121 private roads. This is due to several things. In the first place, the accident record has been good, and the accruals to the injuries and damages fund have been kept down accordingly. The legal work in connection with claims is handled almost entirely by the city's legal department and is not charged against street railway operations, the total law expenses charged being only $1,111. Then, too, persons are not so likely to bring suit against the city as against a private corporation, either because they feel the cost will come back in the form of taxes, or because they fear that it is useless to expect large judgments against the city. In addition to the accident situation, other city departments are called on to give service to the street railway department as occasion demands. For instance, all purchases are made through the city's purchasing department except in the case of special items.

It is patent that the amount charged to taxes, 3.2 per cent of the gross, is much less than for the usual street railway, being only 43 per cent of that for the other companies. In the charter of the city it is provided that taxes on the physical property of the entire street car system be levied, the same as if privately owned. This does not, however, include taxes at the rate charged in many other cities, which frequently runs 5 to 7 per cent of gross. Furthermore, no federal taxation at all has to be included, as this is a department of the municipality, and hence exempt under the law.

The auxiliary operations of the private companies as reported provided net revenues just about sufficient to offset the lower rate of taxation enjoyed by the city, so that the net operating income is not far different in the two cases. The non-operating income of the private companies is considerably the greater, so that the gross income applicable to bond interest, dividends and surplus is somewhat higher for the 121 roads.

The income deductions in the case of Detroit are considerably more. The city is paying interest on bonds covering the entire investment made in the property. Certain critics have claimed that this is less than the real value of the system, and that the D.U.R. was forced to sell at a loss. Be that as it may, the city is paying interest at the current rate for municipal loans, averaging about 5¼ per cent as against 6 to 8 per cent demanded today from private railways. It is also applying earnings to a sinking fund to retire the bonds over a period of about thirty years. Since the investment will be wiped off the books at the end of that time, the city states that it does not need to set up a depreciation fund in addition.

TABLE II—OPERATING RESULTS OF 121 PRIVATE RAILWAYS FOR 1922 COMPARED WITH DETROIT FOR FISCAL YEAR ENDED JUNE 30, 1923

	Per Cent of Gross		Cents per Car-Mile	
	1921 Railways	Detroit	121 Railways	Detroit
Operating revenue	100	100	45.7	40.8
Operating expenses	71.7	71.6	32.8	29.2
Net operating revenue	28.3	28.4	12.9	11.6
Net revenue, auxiliary operations	3.7	0.0	1.7	0.0
Taxes	7.4	3.2	3.4	1.3
Operating income	24.6	25.2	11.2	10.3
Non-operating income	1.7	0.4	0.8	0.2
Gross income	26.3	25.6	12.0	10.5
Income deductions	17.8	21.0	8.2	8.6
Net income	8.5	4.6	3.8	1.9
Operating expenses:				
Way and structures	10.0	9.8	4.6	4.0
Equipment	8.7	6.2	4.0	2.5
Power	10.5	10.2	4.8	4.2
Conducting transportation	31.4	37.9	14.3	15.4
Traffic	0.2	0.0	0.1	0.0
General and miscellaneous	9.4	7.5	4.3	3.1
Undistributed	1.5	4.3	0.7	0.0
Total	71.7	71.6	32.8	29.2

Auction Sales in New York.—At the public auction rooms in New York there were sold on Oct. 31 $2,000 Des Moines & Central Iowa Electric Company 5 per cent bonds due 1937, interest March and September 84 per cent; and forty shares Interborough Consolidated Corporation $11 lot.

Files Judgment. — Judgment for $7,832 has been taken by the Fowler State Bank at Rantoul against the Kankakee & Urbana Traction Company, Urbana, Ill., in Circuit Court during a special session of the court. The sum represented money advanced to the company by the bank.

Partial Abandonment Permitted. — By permission of the State Public Utilities Commission, the Fort Collins Street Railway, owned by the city of Fort Collins, Col., will abandon and dismantle that part of its roadbed which extends beyond the corporate limits of the city. There was no opposition.

Stockholders Approve Abandonment. —Abandonment of that part of the road from Garden and Stevenson Streets, Seneca Falls, to Cayuga Lake Park, has been voted by the stockholders of the Geneva, Seneca Falls & Auburn Railroad, Seneca Falls, N. Y. Application for the abandonment will be made of the Public Service Commission.

Files Abandonment Petition. — The Buffalo & Lake Erie Traction Company, through its attorneys, has filed a certificate of abandonment in the office of the Secretary of State, of that portion of its line or road known as the Dunkirk and Point Gratiot line. The line is operated in the city of Dunkirk. It is alleged that the further operation of this line is not considered necessary for the public convenience.

Bonds Issued in Exchange. — The Board of Public Utility Commissioners has granted permission to the Trenton & Princeton Traction Company to issue its 6 per cent gold bonds to the amount of $500,000 to be used in exchange for the 4 per cent bonds of the New Jersey & Pennsylvania Traction Company. The board also approved a mortgage given by the former company to the Northern Trust Company, as trustee.

Initial Preferred Dividend. — The United Gas & Electric Company, New York, N. Y., has declared a dividend of thirty-five-thirty-sixths of 1 per cent on the new preferred stock for the period of July 20 to Oct. 1, putting the stock on a 5 per cent annual basis. The dividend was paid on Oct. 1 to stock of record Sept. 27. The dividend is equivalent to approximately 97 cents on the 64,994 shares of new preferred outstanding.

Considers Abandonment Request.—The Georgia Public Service Commission has taken under advisement a recent request by the Chattanooga Rapid Transit Company, a subsidiary organization of the Chattanooga Railway & Light Company, of Chattanooga, Tenn., to abandon the interurban line operated by the former company between Rossville and Fort Oglethorpe, Ga. Members of the commission visited the line to investigate the advisability of permitting its abandonment.

Property Sold.—The property of the Henderson Traction Company was sold on Oct. 27 by court order to W. H. McCurdy, of Evansville, Ind., for $6,800. Attorney A. H. Funkhouser, of Evansville. made the highest bid. The city of Henderson held prior lien on the property for $4,588 for street oiling tax. The purchaser would not make a statement as to his intentions, but it is understood that he will remove the rails and other equipment and sell it for junk.

Bus Lines Unprofitable.—Street Railway Commissioner Engle of Youngstown, Ohio, recently stated that the buses operated by the Pennsylvania-Ohio Electric Company do not pay. For the month of September the earnings were $21,327, which represented a loss of 2.84 cents per car-mile. The mileage for September was 91,043, with earnings per car-mile of 23.42 cents. According to Mr. Engle's figures the Hillman Street bus is the only line that shows a profit.

Reports a Gain.—For its first quarter of 1923 ended Sept. 30 the Brooklyn-Manhattan Transit Corporation reports a gain of approximately $50,000 in the net operating income compared with the corresponding quarter of 1922. The company received in operating revenue $9,681,053. This was $544,920 more than the Brooklyn Rapid Transit Company received in the same period last year. Operating expenses were $6,485,725 compared with $5,994,057 in 1922. The net income for the period ending Sept. 30 of this year was $814,696.

Denies Abandonment Application.—At a recent hearing before the California Railroad Commission it was brought out that the Nevada County Traction Company operating an electric line between Grass Valley, Calif., and Nevada City since 1901 was insolvent. It was stated that the company had defaulted interest on $60,000 of outstanding bonds since 1921. The loss of revenue was ascribed to the rapid increase of private automobiles. It was stated, however, that the directors had not authorized any application for abandonment or substitution of service and that no application was before the commission. Bus franchises are being sought.

Improvement in Securities Noted.—Public utility securities have improved greatly their investment position in the first half of 1923 as is shown by the decline in the average yield of public utility bonds and in the decrease of the average disparity between municipal credit and public utility credit. This conclusion is based on an analysis by Herbert B. Dorau of the Wisconsin University Research Institute staff of the comparative borrowing power of twenty-five public utility companies and fifteen municipalities.

Lines Sold.—The Galesburg & Kewanee Electric Railway, Galesburg, Ill., has been purchased by Dave Wine, Kewanee, for $50,000. Service on the line has already ceased. While the road was acquired by Mr. Wine primarily for its value as scrap, he announced that he would give the citizens an opportunity to retain the service if arrangements could be made. Immediate cessation of operation was necessitated, he said, in view of the fact that no arrangement had been made by him for protection from liability in case of accidents.

Assessment Left as Recommended.—The Missouri State Board of Equalization has completed final figures on the tax assessments of public service corporations operating in Missouri. The grand total is $381,503,313, which is nearly $2,000,000 less than the total for the same class of property in 1922, and $4,128,945 less than the total recommended by the State Tax Commission. The valuation on street and electric railways amounted to $65,987,881.

The assessment of the United Railways, St. Louis, was left at $44,085,208 as recommended by the State Tax Commission. This is slightly less than the 1922 total.

Property at Newburgh Foreclosed.—The line of the Orange County Traction Company, running from Newburgh to Walden, N. Y., has been sold under the foreclosure of the mortgage against it. The property was bid in by ex-Governor Benjamin B. Odell, president of the company, acting for a committee representing the security holders.

His bid was for $10,000 in addition to liens prior to the mortgage which was being foreclosed. This was held by the National Commercial Bank of Albany as trustee. The prior liens, including mortgage, judgment, interest, taxes, &c., amounted to $579,192. The mortgage foreclosed was to secure $750,000 bonds, of which $324,000 had been issued under the mortgage and on which was due a total of $378,748.

Record for Passenger Traffic.—The Chicago Surface Lines broke all records for passengers carried and receipts on Oct. 20. The receipts for the day were $180,141, the previous high record having been $178,487 on Dec. 23, 1922.

There were carried 2,611,532 cash fare passengers on that day, and it is officially estimated that there were 1,828,060 transfer passengers, so that there was a total of 4,439,592 people transported by the surface lines, or more than the entire population of the city of Chicago. It is probable that the surface lines will break all records for passengers carried this year. Up to Oct. 20 the Surface Lines had carried approximately 587,371,135 cash fare passengers, or 9.37 per cent more than in the same period of 1922.

Increase in Capital Stock Proposed.—The stockholders of the Carolina Power & Light Company Raleigh, N. C., met on Oct. 22 to consider resolutions providing for increase in capital stock from $8,500,000 to $12,000,000, and changing common and preferred stock to a "nonpar" basis. The present authorized capitalization is 50,000 shares of common stock and 35,000 shares of preferred stock, par value $100. Under the proposed amendment of the charter there will be an increase of 10,000 shares of common stock and 25,000 shares of preferred stock, making 60,000 shares of each stock. The increase in capital is considered necessary in order to provide in part the cost of further additions in plants and equipment contemplated. The property of the company includes 15 miles of electric railway.

Proposes Bond Issue for Reconstruction.—An issue of $200,000 in utility bonds to finance reconstruction of the Seattle Municipal Railway tracks, trolley wires and special work in the district bounded by Jackson and James Streets and First Avenue South and Third Avenue South is proposed in an ordinance recently introduced in the City Council. The issue is proposed as a substitute for the $150,000 issue passed a few weeks ago, which was found to be insufficient. The bonds will be a lien against the railway, payable out of revenues. Plans for repaving the district have been held up because of lack of funds with which to rebuild the railway. The Seattle Municipal Railway has returned to the light and water department a loan of $175,000 made three months ago, when the railway lacked funds to meet payrolls because of losses accrued under the 5-cent fare experiment.

Opposes Abandonment. — The International Railway, Buffalo, has applied to the Public Service Commission for permission to abandon the Niagara Falls Sugar Street line, with the result that the petition has become a matter of concern to the City Council, city manager, corporation counsel and other officials. Much opposition has been expressed on the proposed abandonment. President Walter McCulloh of the Chamber of Commerce says that the abandonment of this important crosstown car thoroughfare would be deplorable, in view of the fact that the upbuilding of that territory will be but a matter of a short time, when the paving of the streets as now planned is finished. In a rate hearing before the Public Service Commission several months ago, the International Railway set forth figures to show that the company's lines in Niagara Falls had been operating at a loss of some $103,000 a year.

Traffic and Transportation

Change Made in Token Rate

Commission Orders District of Columbia Companies to Sell Three Tokens for Twenty Cents

Electric railways operating in the District of Columbia have been ordered by the Public Utilities Commission to sell three tokens for 20 cents at their carhouses, offices, substations, power station, "and other points convenient to the public," but not on their cars, effective on Nov. 1.

The order modifies to this extent the previous order for the general sale of six tokens for 40 cents. A general sale, by conductors on cars and elsewhere, of three tokens for 20 cents was asked by the Federation of Citizens' Associations on the ground that many persons did not find it convenient to purchase six tokens at a time. In the arguments at the hearing, counsel for the federation asked that if the three-for-20-cents order be denied, a cash fare of 7 cents instead of 8 cents be ordered. This phase was disregarded in the ruling of the commission as being outside the original petition.

While no official estimate has been made of the effect of the new order upon the revenues of the companies, it is not believed that it will be of much consequence, as most purchases of tokens are made on street cars and these are not affected by the order. Tokens heretofore have been sold at the company offices, carhouses and at certain banks in Washington and it is at such places only that three tokens for 20 cents may be purchased hereafter.

Testimony before the commission showed that about 20 per cent of the passengers of the Washington Railway & Electric Company pay the cash fare of 8 cents and it was estimated that if three tokens for 20 cents were sold on cars half of these cash riders would buy tokens and that the resultant loss in revenue to the company would be $104,000 a year, based on the number of passengers carried in the twelve months ended Aug. 31, last. Similar testimony was not introduced for the Capital Traction Company, but the Utilities Commission itself made an estimate that 24 per cent of the passengers of that company pay the cash fare and that, on the same basis of estimates, loss of revenue by a general change in the quantity of tokens sold would be $109,000 a year.

"The evidence submitted indicates that the returns now enjoyed by the railways are no greater than what is considered fair, and are decreasing," the commission asserted in its decision in the case. This sentence is considered especially significant as forecasting the attitude of the commission regarding the general question of railway fares in the District of Columbia, as there has been agitation in Congress and elsewhere for a return to the 5-cent fare.

The effect of the sale of tokens in smaller quantities by the conductors would be to delay traffic movement "to a small extent," the commission asserted, because of the increased number of transactions between conductors and passengers.

"The riders who are in a position to spend 20 cents for three tokens and cannot spend 40 cents for six are probably few in number," the commission concluded in its opinion.

Injunction to Prohibit Buses Denied

An injunction to prohibit the operation of buses along the route of the Maumee Valley Railway, Toledo, was denied in the Lucas County Common Pleas Court on Oct. 25. The court in denying the injunction said that it was opposed to government by injunction proceedings.

The suit, which was brought by Attorney Leroy L. Eastman, representing the railway, charged that the bus companies were operating without first complying with the provisions of the Collister bus law. The Maumee Valley Railway, of which L. G. Van Ness is president, operates on both sides of the Maumee River, south of Toledo. Mr. Van Ness said that the matter would be taken to the Court of Appeals immediately.

Last year the village of Perrysburg, through which the interurban operates, passed an ordinance prohibiting buses from stopping to take on passengers within the corporate limits of the municipality. The bus companies went into court and obtained an injunction against the city. The matter was taken to the Ohio Supreme Court by Attorney Eastman, where he succeeded in having the injunction dissolved.

Will Start Auxiliary Bus Service in Springfield

Following the threat of the City Commission to repeal its anti-bus ordinance and permit general operation of buses on Springfield, Ohio, streets unless the Springfield Street Railway started some kind of service to the Melrose addition in accordance with its franchise terms the company recently notified the commission in special session that it would start auxiliary bus service to connect with cars on Nov. 5. The commission at a regular meeting on Oct. 29 gave the company twenty-four hours to make final reply to its ultimatum demanding service.

A resolution ordering the building of the new track was passed some time ago without a dissenting vote. When the company was approached on the subject it declared it would be impossible to build the extension as a loss of $10,000 had been incurred so far. The matter rested until a delegation of citizens from the Melrose addition appeared before the commission and pressed for action, with the resultant passage of the resolution threatening revocation of the franchise and repeal of the anti-bus statute.

Rehearing Called on Mail Pay

The Interstate Commerce Commission will begin a hearing at Washington on Nov. 19 on the application of the Post Office Department to readjust the compensation of electric railways for handling United States mails. This is a reopening of the case started in July, 1918, when the commission, on its own motion and following the suggestion of a bill enacted by Congress, ordered an investigation to determine reasonable rates for transporting mail by urban and interurban electric railroads and for the incident service.

It will be recalled that in August, 1920, the commission handed down an order which had the effect of increasing the compensation to the carriers, but the results were not satisfactory to the American Electric Railway Association, which filed an application for a rehearing. The Post Office Department in 1922 filed a petition for reopening of the case, on the grounds that conditions had changed since the 1920 order of the commission so as to justify revision downward of the rates.

Testimony and evidence in the case will be presented before an examiner for the commission, beginning Nov. 19, and the proceedings are expected to occupy several weeks. Eventually, arguments will be heard before the commission itself, after the examiner's report has been submitted.

Wisconsin Commission Authorizes Use of More One-Man Cars

The Wisconsin Railroad Commission has granted formal permission to the Wisconsin Public Service Corporation to continue the operation of one-man cars on its Green Bay-Kaukauna interurban line. The company pleaded the need of the strictest economy in operation, and submitted to the commission statements showing the difference in cost of operation that resulted from the change to one-man car operation and also data on accidents.

C. E. Kohlhepp, auditor for the company, said the railway department in Green Bay, including the city and interurban lines, had incurred a deficit of $190,159 in 1922 and a deficit of $94,818 in the first seven months of 1923.

C. E. Warwick, representing the company, testified that the one-man cars with the new safety appliances were as safe as the two-men cars. J. P. Pulliam, vice-president and general manager of the company, said that accidents have been materially reduced the last two years and that step accidents to passengers have practically ceased with the operation of one-man cars. He said further that the saving resulting from the one-man cars would forestall an increase in rates.

This ruling of the commission followed close on the heels of its decision permitting the Eastern Wisconsin Electric Company to operate one-man cars between Neenah and Fond du Lac.

Traffic Signals to Be Installed in New Orleans

The sum of $17,000 will be spent by the city of New Orleans for the installation of fifty additional electric traffic signals, in the near future, specifications for which are now being prepared by City Engineer Klorer. A traffic tower will be erected at Rampart Street and traffic signals installed from that point at all intersections of Canal Street to Peters Street and at other intersections. This improvement is based upon an agreement reached by the Commission Council of New Orleans with the Canal Street Merchants' Association, which is urging the adoption of that portion of the Beeler report governing regulation of traffic on Canal Street, thereby increasing the parking space for cars and relieving present congestion. The Canal Street Merchants' Association will bear $7,000 of the expense of improvement.

Traffic Solution Prizes Total $1,500

Prizes totaling $1,500 were recently awarded in the traffic problem contest started in the Keith, Proctor & Moss vaudeville theaters, as a constructive contribution to the recent Silver Jubilee celebration of New York City. The winning suggestions were the best of more than 1,200 plans entered in the eliminating contests in twenty vaudeville theaters. All the capital prize-winners submitted their plans through the Palace Theater.

The winner of the first prize, who was the chief engineer of the Board of Estimate, offered three suggestions for the traffic solution in New York City. Among these was the substantial relief for the section adjoining Forty-second Street by making all north and south streets one-way streets, and introducing the block system of traffic control. The winner of the second prize suggested doing away with all sidewalks on principal streets and making arcades in front of stores. Another suggestion included vehicular subways, and still another proposed removing all trolley lines on streets running east and west, and constructing ramp bridges at all east to west crossings.

Taking Action on One-Man Cars

Representatives of local unions in Massachusetts associated with the Amalgamated Association were present at a recent special meeting for the purpose of formulating action on the elimination of one-man cars. They will back a law which provides that no car of any railway shall be operated with fewer than two employees. Further, that the act if enacted by the Legislature shall be submitted for acceptance to the voters of each city and town in which a car is operated by one man and shall take effect in such cities and towns thirty days after acceptance.

Public Told About New Fort Wayne Cars

Letters to all automobile owners in the city, placards posted in practically all garages of the city, car cards and full page advertisements in the local newspapers are being utilized by the Indiana Service Corporation to announce a new type of street car now being placed on the Fort Wayne, Ind., city lines.

"There was a time when we put new types of cars in service and let the general public find out about them as best they could," says J. A. Greenland, superintendent of transportation and traffic. "That day is past, however, and now when we contemplate a change in service, especially such as at present, when the change will affect other street traffic, we make it a point to tell the public all about it."

The announcements are occasioned by the purchase of new type cars, with front entrance and rear exit. Cars now in use have front entrance and exit only.

Cars now in use on the city lines are single truck, front entrance and exit. As Mr. Greenland explains, the rear exit cars are expected to speed up traffic. They are also operated by one man.

There are twenty-five cars of the new type now being added to the city service. Of these, fifteen are new and ten have been rebuilt from double-truck cars formerly in operation and on which two men had been used. All city street cars are now in one-man operation.

Petition for Abolition of One-Man Cars.—Three hundred property owners living along the route of the June Street line of the Worcester Consolidated Street Railway have petitioned the Mayor and Aldermen for the abolition of one-man car service which was started recently.

Grants Bus Franchise.—A franchise has been granted the Monogahela-West Penn Public Service Company, operating lines in northern West Virginia, to operate a bus line between Morgantown and Rivesville. At the latter point connection will be made with the trolley cars for Fairmont. The company is expected to start this service as soon as the necessary equipment can be secured.

School Attendance Helps Railway.—Increased attendance at Teachers' College, resulting in greater patronage of its railway lines, caused a reduction in fare from 8 to 7 cents on the lines of the Waterloo, Cedar Falls & Northern Railway. C. D. Cass, general manager of the company, has promised further cuts "if patronage warrants."

Colored Lights Standardized.—The Tacoma Railway & Power Company has completed standardization of colored lights on the front of the various car lines of the company designed to make it easier for patrons to recognize their cars at night. Each color combination represents a particular car line and the company has advertised the change, so that all may familiarize themselves with their particular light.

Seek Fee Refund. — The Michigan Public Utilities Commission is investigating the operation of a large number of motor buses which have recently discontinued business whose operators are now seeking to get their application fee refunded to them. Most of them operated in a former resort territory and have been operating under a permit issued by the commission requiring their filing of necessary insurance and other papers.

Hears Petition for Increased Fares.—The Public Service Commission late in September held a hearing on the application of the City Railways, Wheeling, W. Va., for an increase in fare on its Mozart Park line in Wheeling. It was claimed by the company that the line was operating at a loss and was used to little extent. There were none present to contest the proposed increase of the company, which was represented by one of the management and Attorney John J. Coniff.

Perfect Thirty-one Days.—Keokuk car operators made their slogan "Thirty-one Days Without an Accident" a reality when they completed their safety first drive for the month of August. Telegrams of congratulation were received by the men shortly after from H. T. Edgar, division manager, and David Daly, district manager of Stone & Webster. Walter H. Burke, local manager of the Keokuk Electric Company, has given the men a dinner in recognition of their achievement. The drive was planned and directed entirely by the car operators.

More One-Man Lines Planned.—Five divisions of the Louisville & Interurban Railway lines will have one-man safety cars in use by Jan. 1, according to Richard H. Wyatt, general superintendent of the Kentucky company. One-man safety cars are to be placed in use on the Orell division Nov. 11 and on the Fern Creek division some time in December, Mr. Wyatt said. The safety cars are now in use on the Jeffersontown, Prospect and Okolona divisions.

Will Use One-Man Cars.—The Galveston Electric will soon install one-man safety cars in Galveston, according to an announcement by Raymond G. Carroll, vice-president and general manager. The installation of the one-man cars will be gradual, Mr. Carroll said, only one or two cars being put in service at first. It is planned, however, to convert the entire system to the one-man car. Mr. Carroll said that the number of automobiles in use in Galveston is the direct cause of the installation of one-man cars.

New Pass Plan.—Effective Nov. 5, the Pennsylvania-Ohio Electric Company will place in use on its interurban line between Youngstown, Ohio, and New Castle, Pa., two forms of the unlimited-ride weekly pass. One form, selling at $3.75, will be used for transportation from terminal to terminal, or intermediate points, a distance of 19 miles. The other will sell at $1.75 and will be used for transportation between New Castle and Edenburg, or intermediate points. This pass will be of advantage to suburban dwellers going to and from work and also for shopping in New Castle. It also will be of advantage to industrial riders from New Castle to Edenburg.

Dining Chair Coaches Ready.—The Interstate Public Service Company, Indianapolis, Ind., will put into service during the next few weeks Pullman combination dining and chair cars between Louisville and Indianapolis. The cars will be operated during the usual meal hours, and more will be put on as the patronage demands. First definite announcement of this improved service was made by L. M. Brown, general superintendent of the division. The cars, some of which already have been ordered, will be like standard equipment of the kind used on steam roads with the dining room at one end and the chairs at the other, with the kitchen separating them. The order has been referred to previously.

Fare Lowered.—A new fare schedule recently approved by the Public Service Commission authorizes a minimum charge in the fifty-trip commutation book reduced from $5 to $3.75 on the Auburn & Syracuse Electric Railroad. The order became effective Oct. 20. Fares heretofore applying for the sale of such commutation books for transportation to and from Auburn and to and from Syracuse are canceled. Fares to and from Auburn will be obtained by using the interurban commutation fare to and from Soule plus fifty times the regular one-way fare between Soule and Auburn. Fares to and from Syracuse will be obtained by using the interurban commutation fare to and from the city line plus fifty times the one-way city fare

Petition for Old System.—All night service into Tremont Street subway in Boston was started Oct. 14. Petitions bearing 1,400 names of night workers have been presented to the railway protesting against the early morning car service and petitioning to put the night cars back on Adams Square. It is claimed that only those who work in the immediate neighborhood of Scollay Square, Park Street and Boylston Street stations are at all benefited by the new order. All the others who were used to getting the cars at their doors are forced to walk. It is their contention that conditions would be improved if the old service were restored, because most of them, tired after a night's work, might go from their work to the street and get the cars without a long walk being necessary.

Personal Items

F. de Lancker Heads International Tramways Union

General Manager of the Brussels Tramways Is Elected to Succeed Mr. de Burlet

C. de Burlet, honorary director general of the Société Nationale des Chemins de fer vicinaux of Belgium, resigned on Oct. 9 as president of the Union Internationale de Tramways de Chemins de fer d'intêret local et de Transports Publics Automobiles. Mr. de Burlet has been president of the organization for the last eleven years. In his letter of resignation Mr. de Burlet says that it is with great regret that he retires from the presidency after an active association with the organization for more than forty years, but his advancing years and obligations of health compel him to do so. He feels that the recent convention in Brussels proves that in spite of the war, the association is as important and necessary to the industry as ever, and that the large attendance and notable success of that meeting show that it has taken on a new life and that the crisis in its existence has passed.

Although organized in 1885, the Union Internationale de Tramways de Chemins de fer d'intêret local et de Transports Publics Automobiles has had only three presidents. The first was Gustave Michelet, then general manager of the Brussels Tramways, who was elected president at the organization meeting in Brussels. He continued in the office of president until his death in 1897. He was succeeded by Baron Janssen, then president of the Brussels Tramways, who occupied the office for fifteen years, when he was elected honorary president. Mr. de Burlet at the time of his election was general manager of the Société Nationale des Chemins de fer vicinaux, a large interurban railway property in Belgium under partial government ownership.

Mr. de Lancker, the new president, is general manager of the Brussels Tramways. His election has just been ratified by ballot by the members.

Messrs. Vance and Hendricks in Charge of Purchases of Merged Companies

Harry J. Vance, purchasing agent for the Illinois Power & Light Corporation, with headquarters at Peoria, Ill., has been made purchasing agent for the Illinois Traction, Inc. Mr. Vance will have his headquarters at Chicago.

W. P. Hendricks, for a number of years associated with the William A. Baehr Organization, consulting engineers, Chicago, will be the new purchasing agent for the Illinois Power & Light Corporation, with headquarters at Chicago.

Harry Vance is well known throughout Illinois, having for many years been purchasing agent for the Illinois Traction System, which company became a subsidiary of the Illinois Power & Light Corporation last June.

Otto M. Rau Appointed on Power Survey

Otto M. Rau, an engineering specialist in hydraulics, power generation and natural resources, has been appointed in a consulting capacity on the staff of the Giant Power Survey of the Commonwealth of Pennsylvania. This survey has been started in Pennsylvania at the suggestion of Governor Pinchot. Mr. Rau will be located in a Philadelphia office which has been opened in the Fuller Building and will have charge of studies of power requirements, stations and transmission lines.

Mr. Rau's early experience was gained with the engineering department of the Edison General Electric Company, New York. He later became identified with the Milwaukee Electric Railway & Light Company as chief electrician and general superintendent of the lighting and power department. During the war Mr. Rau acted as consulting engineer to the power section of the Emergency Fleet Corporation. At the close of the war he became connected with Day & Zimmermann of Philadelphia in charge of public utility management and was later with the Stotesbury-Mitten management of the Philadelphia Rapid Transit Company where he did specialized work on pulverized fuels and making superpower studies. His appointment, together with that of Dr. Frederick H. Newell of Braddock, Pa., was made by Morris L. Cooke director of the power survey and former director of public works in Philadelphia.

Mr. Doerr Leaves Connecticut Company

J. H. Doerr has resigned as roadmaster of the Connecticut Company, effective on Nov. 1, to become Western representative of the Railway Trackwork Company, Philadelphia, Pa. He will be located in Los Angeles, Caf. For the past three years Mr. Doerr has been stationed in Waterbury for the Connecticut Company.

Mr. Doerr was graduated from Sheffield Scientific School, Yale, in 1912, and entered the employ of the Connecticut Company in its maintenance of way engineering department. During his first four years with the Connecticut Company Mr. Doerr's work covered all branches of track engineering from layout to installation. At the completion of this term of service he left the company and during the following four years engineered and supervised the construction of many industrial and power-transportation projects. This work completed, he again associated himself with the Connecticut Company as roadmaster.

William S. Hamilton has resigned as general superintendent of the Schenectady Railway.

Thomas J. Lynch has been appointed general manager of the Schenectady Railway, Schenectady, N. Y.

Nat Ozmon has been appointed to succeed Harry W. Cushman as assistant superintendent of the Tri-City Railway, Davenport.

W. H. Rudisill is superintendent of engineering of the Manila Electric Company and Maurice W. Toby, formerly roadmaster, has now the title of engineer of maintenance of way.

E. Dobson is roadmaster of the Sarnia Street Railway, Sarnia, Ont., replacing in that capacity William Bolton.

C. W. Lightner is superintendent of line construction of the Bakersfield & Kern Electric Railway, Bakersfield, Calif.

F. M. Warnken has succeeded B. K. Noble as superintendent of the West Helena Consolidated Company, Helena, Ark.

R. M. Hannaford is acting chief engineer of the Montreal Tramways. W. F. Graves was formerly chief engineer.

George W. Scott has succeeded Ralph Chandler as second vice-president of the Phoenix Railway, Phoenix, Arizona. L. M. Ford is now treasurer, replacing A. D. Haskell, acting treasurer.

Loren Barton is vice-president of the Glendale & Montrose Railway, Glendale, Calif., succeeding John Treanor. Mr. Barton's office is located in the Corporation Building, Los Angeles.

Huey P. Long, chairman of the Louisiana Public Service Commission, has announced his candidacy for Governor of Lousiana subject to the action of the Democratic voters in the election to be held in January, 1924.

Dan. C. Smith, for seven years manager of the Fort Smith Light & Traction Company, has resigned and accepted a position with the Byllesby Engineering Company of Chicago, operating managers of the local utilities at Fort Smith. Ark.

Arthur E. Scott, manager of the Louisville branch of the Atlantic Tank & Barrel Corporation, Louisville, for a number of years, has recently accepted a position with the Interstate Public Service Company, Indianapolis, as director of public relations.

E. J. Rosenauer, formerly general auditor of the Southern Colorado Power Company, has resigned to become assistant treasurer and general auditor of the Wisconsin-Minnesota Light & Power Company, with headquarters at Eau Claire, Wis. Mr. Rosenauer has been connected with the Byllesby interests for sixteen years, the last ten of which he held the position from which he just resigned.

Obituary

R. J. Morrisson

R. J. Morrisson, general manager of the Poughkeepsie & Wappingers Falls Railway, Poughkeepsie, N. Y., died on Oct. 29. Mr. Morrisson had been playing golf that afternoon with Charles Brooks, his predecessor as manager of the property, and left Mr. Brooks to prepare for dinner at Mr. Brooks' residence. When he did not appear Mr. Brooks made inquiries which led to the discovery of Mr. Morrisson's body in the bathroom of his apartment, where it was later established he had been accidentally overcome by carbon monoxide gas.

Mr. Morrisson has been in the public utility business since 1914. At the age of 17 he was secretary to Charles S. Banghart when Mr. Banghart was vice-president and manager of the Binghamton Railway, Binghamton, N. Y. This position he held until May, 1917, when he enlisted in the Eleventh Engineers. He went to France in July, 1917, with that organization. He was there for a period of twenty-two months. After his return from France Mr. Morrisson went to Augusta, Ga., as assistant manager of the Augusta-Aiken Railway & Electric Corporation under Mr. Banghart. This position he held until the fall of 1920. He was then promoted to private secretary to James H. Pardee, president of the J. G. White Management Corporation. This position he held until October, 1922, when he was made manager of the Poughkeepsie & Wappingers Falls Railway. Although Mr. Morrission was a very young man his work indicated that a career lay ahead of him that would have reflected great credit upon him personally and probably would have been a source of pride to the industry itself.

George H. Moseman, for the past twenty-five years New England sales agent for the Weston Electrical Instrument Company, Newark, N. J., with headquarters at Boston, died suddenly Oct. 28 at his home in Brighton. Mr. Moseman was born at Bridgeport, Conn., about seventy years ago.

Harry R. Rochester, Western sales manager of Hale-Kilburn Company, died on Oct. 28, at Atlantic City, after an illness of several weeks. Mr. Rochester was born in Ontario on April 10, 1872. He had been with Hale-Kilburn, with offices in Chicago, since 1912. Funeral services were held in Dayton on Oct. 31.

Charles A. Merrill, in the employ of the Brooklyn-Manhattan Transit Company for twenty-two years, died recently at the age of seventy-one. In 1901 he started serving the Brooklyn company as a conductor. In 1906 he was made a dispatcher. He was night dispatcher at the Franklin Avenue depot at the time of his death.

Lewis Otto Hayes, assistant superintendent of the subway division of the Interborough Rapid Transit Company, New York, N. Y., died recently. He had held the position of assistant superintendent since Jan. 15, 1921. His first railway work was with the Chicago Elevated Railway as train clerk. In 1904 he entered the service of the Interborough Rapid Transit Company as trainmaster on the subway division, holding this position until 1921, when he became assistant superintendent, which position he held at the time of his death. Mr. Hayes was born in Edinburg, Ind., on Dec. 16, 1875.

R. L. Woeber, who crossed the plains in an ox cart and arrived in Denver in 1867, is dead. Mr. Woeber saw the need for better transportation and with his brother organized the Woeber Brothers Carriage Company, one of the first businesses of its kind in the West. The name was later changed to the Woeber Car & Manufacturing Company. Practically every car that traverses the streets of Denver today is marked: "Made by Woeber Car & Manufacturing Company." Mr. Woeber had been sick since last February, when he suffered a paralytic stroke. He was eighty-six years of age.

M. E. Stark, general supervisor of tracks of the Connecticut Company, died recently while on a vacation at Niagara Falls, N. Y. Mr. Stark had been in the employ of the company about twenty-three years. He was born at Silver Creek, Mich., in 1856. He started on railroad work in 1882 at Kennebunkport, Me. In 1885 he went to work for the New York Central at Oswego, N. Y. From Oswego he went to Hudson, N. Y., and entered the employ of the Connecticut Railway & Light Company at Waterbury in 1900. In 1902 Mr. Stark was transferred to Bridgeport as superintendent of tracks of that division, in which capacity he served until Aug. 1, 1923, when he was appointed general supervisor of tracks of the entire system of 802 miles.

Fred J. Green, pioneer Ohio electric railway man, died in Springfield Oct. 4. Mr. Green was born at Stevens Point, Wis., in 1861 and went to Ohio about twenty-five years ago. Former Governor Asa Bushnell of Springfield helped Mr. Green in financing and building the old Dayton, Springfield & Urbana line, now a part of the Indiana, Columbus & Eastern Traction Company. Later they built the Columbus-Springfield line, which eventually was sold to the Indiana, Columbus & Eastern. Then came the construction of the Springfield, Troy & Piqua Traction Company, of which Mr. Green remained president until the sale of the road about three years ago and its subsequent junking by the Schoenthal Company of Columbus. Mr. Green was a member of several fraternal orders which participated in the funeral services held Oct. 6 in Springfield.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

$1,250,000 Transmission Line from Keokuk

An electric, double-circuit, steel-tower transmission line, carrying 66,000 volts, will be built from the big power dam at Keokuk, Iowa, to Galesburg, Ill., by the Illinois Power & Light Corporation, which controls the city and interurban lines formerly included in the Illinois Traction system. The improvement will cost $1,250,000. Work will begin at once under the direction of the engineering department of the Illinois Power & Light Corporation. The engineers expect to have the line finished within a year.

An extension of the line, carrying 33,000 volts, will also be built from Galesburg to Galva, a distance of 23 miles. The entire length of the new line development will be approximately 96 miles.

The new line starts at the dam, owned by the Mississippi River Power Company, Keokuk, Iowa. It will run up the Iowa side of the Mississippi River to Fort Madison, cross the river at this point and then extend in a northeasterly direction to Galesburg, following generally the main line of the Santa Fé Railway.

The Galesburg power plant of the company is now up to its full capacity of 4,500 kw. The new line will be capable of furnishing Galesburg electric users with a capacity of 10,000 kw., sufficient, it is believed, for the next ten years.

The Galesburg and Galva power houses will be kept intact as standby plants for use in times of emergency.

Prices Becoming Stabilized; Manufacturing Active

Market conditions at the present time show a tendency in the direction of more stable prices. The decline which occurred during the early part of the year has apparently ended and there has been a moderate upward movement. However, the earlier tendency was not without its advantages, in that it has produced a more sound price structure today than existed six months ago. It is thought that there is little or no chance of returning to the price level of 1913, and those familiar with economic conditions incline to the belief that the present stabilized price level will continue for some time to come.

Pig iron and copper continue to be weak spots in the metal market. The price of pig iron has declined considerably since last spring and there is no reason to expect improvement in the immediate future. This is not surprising, perhaps, in view of the very high level to which the price of pig iron rose last summer. In spite of the decline, its present price bears about the normal relation to the pre-war price.

Movements in copper prices have had a general downward tendency. Lately, however, the domestic demand has been a little larger. Hope is expressed that with users coming again into the market after holding back for some time, prices may go up. Export prices have risen a little, but no great change in this situation can well be expected until European conditions improve and the copper export trade regains something of its former volume.

Manufacturing activity continues at a healthy rate. Stocks are normal in most lines, and future demands are likely to be for immediate consumption rather than for the upbuilding of reserve stocks. The prevalence of hand-to-mouth buying has produced a situation which appears superficially unsatisfactory. Under the circumstances, however, the volume of forward orders can hardly be taken as a safe guide to market conditions. The consumption of raw materials and the production of finished goods indicate that the present situation is fundamentally sound. The fact that there is relatively little unemployment at present, although the seasonal peak of labor requirements for construction and agriculture has now past, is another indication of a healthy condition of industry.

One important steel company is operating at nearly 90 per cent of capacity, and the rate of operation for the steel industry as a whole is approximately 85 per cent. The United States Steel Corporation has increased its current dividend one-quarter of 1 per cent, or from the established rate of 1¼ per cent to 1½ per cent, quarterly.

Creditors Vote to Extend Payment of Outstanding Accounts

At a special meeting of the creditors of the Missouri Car Company in the Columbia Building, St. Louis, on Oct. 26 a motion was carried to extend half the outstanding accounts until Jan. 1, 1924, and the other half until March 1, 1924. Notes will be made out for the amounts due to the creditors, to whom they will be sent in exchange for the old notes. The plant of the company is covered by a blanket mortgage having precedence over other claims. Creditors are to be taxed 4 per cent of their claims in order to assist Orrin Merry, president of the company, in his program for rehabilitating the company. A committee of three creditors, appointed on Aug. 6, is now working with Mr. Merry in the interest of all the creditors.

Westinghouse Official Decorated. — Guy E. Tripp, chairman of the Westinghouse Electric Company, who is in the Far East in connection with reconstruction work in Japanese cities destroyed by the earthquake, has been decorated by the Japanese government.

ELECTRIC RAILWAY MATERIAL PRICES—OCT. 30, 1923

Metals—New York

Copper, electrolytic, cents per lb.	12.562
Lead, cents per lb.	6.45
Nickel, cents per lb.	29.50
Zinc, cents per lb.	7.00
Tin Straits, cents per lb.	41.50
Aluminum, 98 to 99 per cent, cents per lb.	25.20
Babbitt metal, warehouse, cents per lb.:	
Fair grade	52.00
Commercial	25.00

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads	$4.425
Somerset mine run, Boston	2.50
Pittsburgh mine run, Pittsburgh	1.925
Franklin, Ill., screenings, Chicago	1.45
Central, Ill., screenings, Chicago	1.05
Kansas screenings, Kansas City	2.25

Track Materials—Pittsburgh

Standard Bessemer steel rails, gross ton	$43.00
Standard open hearth rails, gross ton	43.00
Railroad spikes, drive, Pittsburgh base, cents per lb.	3.15
Tie plates (flat type), cents per lb.	2.575
Angle bars, cents per lb.	2.75
Rail bolts and nuts, Pittsburgh base, cents, lb.	4.125
Steel bars, cents per lb.	2.40
Ties, white oak, Chicago, 6 in.x8 in.x8½ ft.	$1.30

Hardware—Pittsburgh

Wire nails, base per keg	3.00
Sheet iron (28 gage), cents per lb.	3.75
Sheet iron, galvanized (28 gage), cents per lb.	5.00
Galvanized barbed wire, cents per lb.	3.80
Galvanized wire, ordinary, cents per lb.	3.35

Waste—New York

Waste, wool, cents per lb.	13–17
Waste, cotton (100 lb. bale), cents per lb.:	
White	12–14.50
Colored	9–14

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), per gal.	$0.95
White lead (100 lb. keg), cents per lb.	11.375
Turpentine (bbl. lots), per gal.	$0.98
Car window glass, (single strength), first three brackets, A quality, discount*	84.0%
Car window glass, (single strength), first three brackets, B quality, discount*	86.0%
Car window glass, (double strength) all sizes, A quality, discount*	85.0%
Putty, 100 lb. tins, cents per lb.	4–6

*These prices are f.o.b. works, boxing charges extra.

Wire—New York

Copper wire base, cents per lb.	14.625
Rubber-covered wire, No. 14, per 1,000 ft.	$6.60
Weatherproof wire base, cents per lb.	18.00

Paving Materials

Paving stone, granite, 4x8x4, f.o.b.	
Chicago, dressed, per sq.yd.	$3.60
Common, per sq.yd.	3.20
Wood block paving 3½, 16 treatment, N. Y., per sq.yd.	2.79
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots	54.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd.	1.75
Cement, Chicago consumers net prices, without bags	2.20
Gravel, ¾-in., cu.yd., f. o. b. N. Y.	1.75
Sand, cu.yd., N. Y.	1.25

Old Metals—New York and Chicago

Heavy copper, cents per lb.	9.75
Light copper, cents per lb.	8.75
Heavy brass, cents per lb.	5.25
Zinc, old scrap, cents per lb.	4.125
Yellow brass, cents per lb. (heavy)	5.75
Lead, heavy, cents per lb.	5.50
Steel car axles, Chicago, net ton	$15.25
Old car wheels, Chicago, gross ton	17.75
Rails (short), Chicago, gross ton	19.75
Rails, (relaying), Chicago, gross ton	33.50
Machine turnings, Chicago, net ton	6.75

Rolling Stock

Nic Le Grand, Inc., is installing safety devices on one-man cars of the Saginaw Transit Company.

Eastern Wisconsin Electric Company, Sheboygan, Wis., has placed an order with the St. Louis Car Company for four new Birney safety single-truck cars equipped with the latest safety appliances. Delivery is expected before Jan. 1. The new equipment is planned to give better and speedier service in Sheboygan.

Los Angeles Railway will construct twenty more cars in the main shops at Fifty-fourth Street and South Park Avenue, according to an order of General Manager Kuhrts in the 1924 program of company work. The twenty cars will be similar to the fifty-five cars that are being built in the 1923 program. They will be four-motor cars and equipped for single unit or train operation.

Track and Line

Philadelphia Rapid Transit Company has placed on order with the Lorain Steel Company for 4,000 tons of light rails.

New Jersey & Pennsylvania Traction Company, Trenton, N. J., will lay new rails on West Hanover Street, Trenton, between Willow Street and Green's Place.

Chicago & Joliet Electric Railway, Joliet, Ill., is engaged in eliminating a large grade crossing. The trolley track will pass over both the state highway and a steam railroad.

Hattiesburg Traction Company, Hattiesburg, Miss., is overhauling Hardy Street. The roadbed has been graded, new cross ties placed and the right of way cleaned.

Altoona & Logan Valley Electric Railway, Altoona, Pa., is lengthening all switches for passing purposes between Altoona and Tipton. This is because of the greater traffic that is expected through the opening of a motor speedway at Tipton.

City Railway, Dayton, Ohio, has asked the City Commission for permission to extend its lines several squares beyond the present loop. The company desires to extend the Third Street line from its present terminus at the Dayton and Eaton pike.

Mobile Light & Railroad, Mobile, Ala., will be requested to extend its line down Government Street or nearer to the Louisville & Nashville depot so that persons leaving and arriving by train may have better service and also so that women and children will have protection while traveling

Chattanooga, Tenn.—The public utilities in Chattanooga, exclusive of the railroads, are spending approximately $952,000 on improvements and additions during the current year. The largest expenditure is by the Tennessee Electric Power Company, which is estimated at $582,000.

Los Angeles Railway started construction of the track on Evergreen Avenue between First Street and Brooklyn, at the Brooklyn Avenue end. This will give a cross-town service for Hollenbeck Heights. The company is also extending its Vermont Avenue line from First to Monroe Street.

Washington Railway & Electric Company has completed physical improvements on its Columbia, or H Street, line at a cost of $361,653, which includes new and heavier rails, a concrete roadbed, new switches and new third rail. The new track extends from Fifteenth and H Streets Northeast to Twelfth Street and New York Avenue Northwest. Heavy rails of especial design were used to carry the trains of the Washington, Baltimore & Annapolis interurban, which reaches its Washington terminal over this route.

Monongahela-West Penn Public Service Company will repair its tracks on Eighth Street from Juliana to Ann Streets in Parkersburg. The present tracks will be replaced with new ones and will probably be laid in a concrete base. A 9-ft. right of way for the tracks extending over the block from Juliana to Ann on Eighth Street has been arranged. The tracks have been in bad condition for some time and arrangements have been made to repair them, but several difficulties were encountered which delayed starting the work.

Power Houses, Shops and Buildings

Empire State Railroad Corporation, Syracuse, N. Y., has awarded a contract for a new station at Minetto and the Public Service Commission has dismissed complaint by residents of Minetto asking for the station facilities.

Public Service Railway, Newark, has informed the City Commission of Trenton that it is now seeking a new site on which to erect a modern terminal for the cars of the Newark-Elizabeth and Camden divisions. Some time ago the company endeavored to secure the old Trenton Bank in the heart of Trenton, but this was taken over for other purposes.

Trade Notes

E. I. Du Pont de Nemours & Company, Fabrikoid Division, Newburgh, N. Y., has appointed Ross F. Hayes, 2 Rector Street, New York City, as Eastern sales agent, railway department, for sale of its Fabrikoid products. Mr. Hayes' territory includes New England, southern and middle Atlantic States.

Traffic Signal Corporation of New York City has filed an amended certificate in the office of the Secretary of State at Albany increasing its capital stock from 500 shares, of which 400 are preferred $100 par value and 100 common non-par value, to 600 shares, of which 200 are preferred $100 par value and 400 shares common no-par value.

F. C. Richmond Machinery Company, representative for the Conveyors Corporation of America, Chicago, has moved its offices and salesrooms to 320 West Second South Street, Salt Lake City. The F. C. Richmond Machinery Company is one of the largest mill supply houses in the West.

Eccles & Smith Company has sold out and is retiring from business both in San Francisco and Los Angeles. Its machine tool business was sold to the Waterhouse & Lester Company and the railway supply business is being taken over by Robert W. Jamison, 637 Mission Street, San Francisco, and C. Eccles in Los Angeles.

The Society for Electrical Development through its directors has authorized the establishment of an office at 527 Rialto Building, San Francisco, in order to render a more personal and intimate service to the electrical industry of the Pacific Coast. Samuel H. Taylor, formerly president, Electric Railway & Manufacturers Supply Company of San Francisco, has been appointed Pacific Coast manager. Mr. Taylor will continue to serve as secretary of the Pacific Coast Electrical Association.

New Advertising Literature

Conveyors Corporation of America, Chicago, Ill., has issued a folder entitled "American Air-Tight Doors."

Wagner Electric Corporation, St. Louis, Mo., has issued Bulletin 134 entitled the Fynn-Weichsel Motor.

Crouse-Hinds Company, Syracuse, N. Y., has issued folder No. 7 entitled "Flanged Obround Condulets." The folder contains a full page spread of the obround condulets, covers and wiring devices.

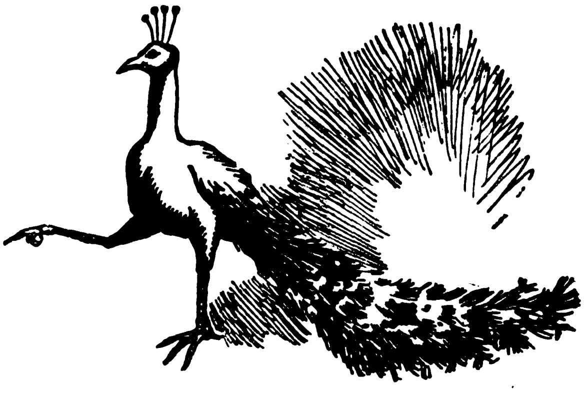
Reo Motor Car Company, Lansing, Mich., has issued a thirty-five-page book on passenger buses on the speed wagon chassis. The company has also issued in pamphlet form a report of a special investigation on the installation of the Richmond Rapid Transit Company, the Detroit City Motor Transportation Company, the Owosso-Flint Bus Line, Inc., the Mason-Lansing Bus Line and Cain Brothers interurban line.

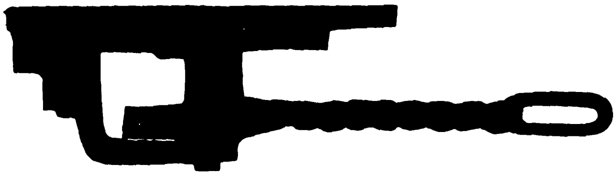
Pioneer High-Speed Machine Knife & Tool Company, Cleveland, has issued a pamphlet announcing the establish ment of a new company of craftsmen concentrating on the production of cutting tools of improved quality and marked economy. The company is headed by A. W. Ericson, who has specialized in the manufacture of sheer blades and knives for thirty-one years. The organization is called Pioneer High Speed Machine Knife & Tool Company "because of the years invested in attaining the requisite experience and skill."

Dummy Practice!

Tackle low!

On every college field, these cool November days, the boys are tackling the dummy. It's only practice, of course, but the knowledge of how to tackle correctly, and the experience in actually doing it—may stop the on-rushing opponent in the crucial Fall Game.





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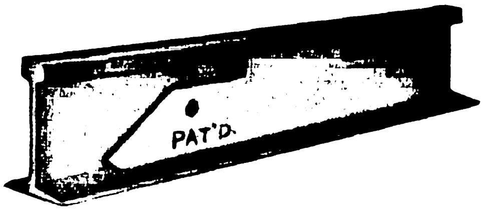

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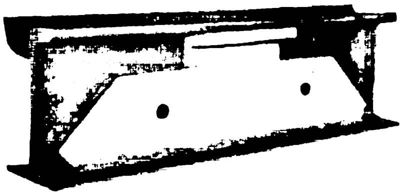

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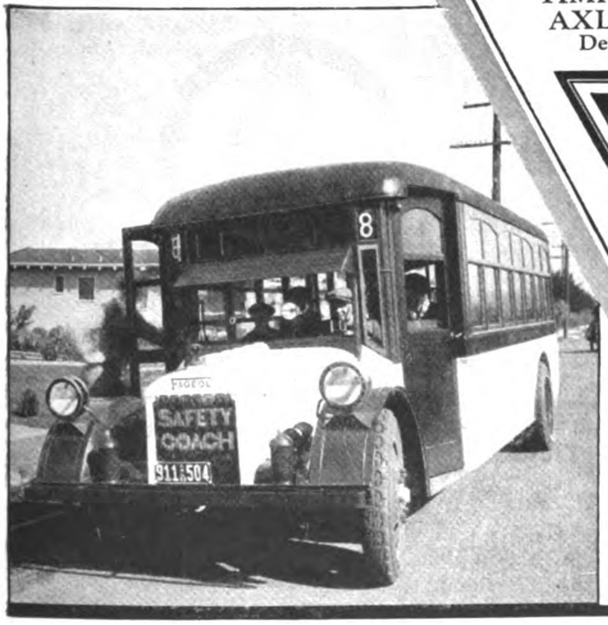
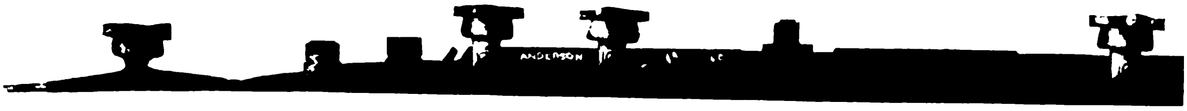


500
SPECIAL
LIMIT'D STOPS

AXLES



Overhead Conductor Bar Construction

Replace your copper by steel

At certain points your traffic is so heavy that the finest trolley wire you can buy will only give a few months service.

At these points, replace the wire by steel or iron bar construction.

Anderson makes a complete line of overhead material necessary for this bar construction.

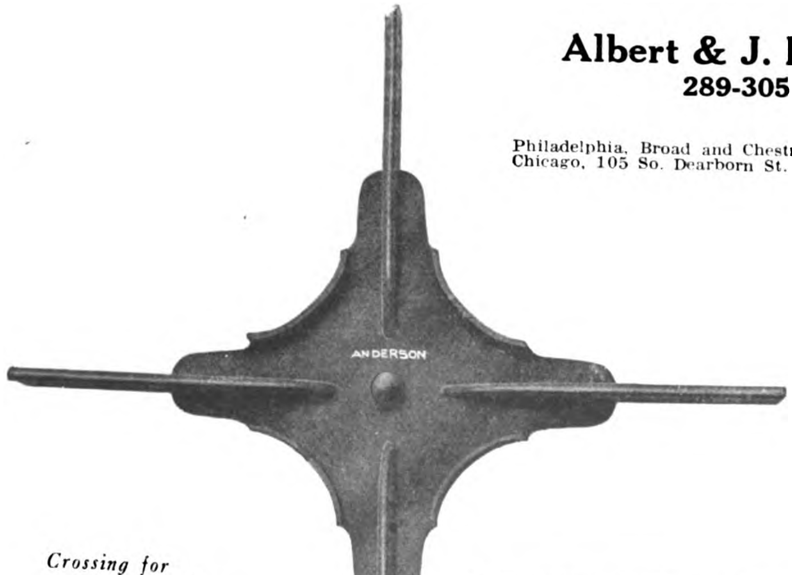
Starting from the left, the illustration above shows a trough hanger for suspending the trolley wire ear; next is the splicer for joining the wire to the bar; next comes two hangers with clevises; then follows the feeder lug; then a 'U' steel connection for joining the steel bars, and then another hanger.

Below is shown a crossing, section insulator and a frog for this bar construction—everything complete to help you keep down maintenance and replacement costs, where the traffic plays havoc with the wire and other overhead material.

Send for further particulars.

Albert & J. M. Anderson Mfg. Co.
289-305 A St., Boston, Mass.

Branch Offices:
Philadelphia, Broad and Chestnut Sts.
Chicago, 105 So. Dearborn St.
New York City, 135 Broadway
London, 12 Moor Lane, E. C. 2



Crossing for Overhead Conductor Bar Construction

Section Insulator for Overhead Bar Construction

Frog for Overhead Bar Construction

If You Should Ask That We Summarize
the facts about Travelers Group Life Insurance in TWENTY BRIEF PARAGRAPHS
We would say:

That Group Insurance was *not discarded* by employers who discontinued many other employee-welfare plans when business tightened up.

That the number of employers carrying Group Insurance has *increased every year* since the first policy was written.

That *two million employees* and their families are now protected by Group Insurance.

That Group Insurance is no longer an experiment and its *returns are sure*, not problematical.

That Group Insurance improves the relationship between employer and employee and makes easier the adjustment of all *differences* that may arise as between *capital and labor.*

That an organization protected by Group Insurance is *tempered* throughout with good will.

That Group Insurance helps make a good working force a *better* one.

That employers can not secure a larger return by the expenditure of *25 cents* per week per employee in any other way.

That the employer can buy life insurance protection for his employees under a Group policy at *one-fourth the cost* of life insurance bought by employees individually on the weekly premium plan.

That many employees who will be insured under a Group Policy *could not pass* a medical examination and get any kind of life insurance individually.

That Group Insurance is *a measure of undeniable justice.*

That the Travelers pay envelope stuffers, booklets, bulletins, etc., keep the employees' *appreciation* of Group Insurance at high-water mark.

That the safety bulletin and safety literature service which goes with Travelers Group Insurance *increases production*

That The Travelers sells Group Life Insurance, as well as Regular Life Insurance, at *guaranteed low cost.*

That premiums paid for Group Insurance are deductible from gross income, in accordance with the Federal *Income Tax Law* as amended by Act of 1921.

That premiums may be paid annually, semi-annually, quarterly or monthly.

That the insurance of new employees becomes effective *automatically* and amounts of insurance on old employees increase *automatically* (if a service formula is used) in accordance with the terms and plan outlined in the master policy.

That the Group Policies and Certificates of The Travelers contain a broad and liberal permanent total *disability clause.*

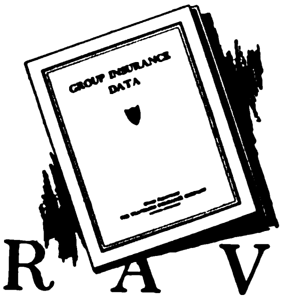
That the *Travelers plan* of handling Group Insurance reduces to a minimum the bookkeeping work required of the employer.

That the Travelers claim organization, dating back 60 years and extending over the entire continent, is able to *pay claims within a few hours* after notice.

That the number of employers who have selected The Travelers for their group insurance exceeds the number that have chosen any other company by 45 percent.

This portfolio, giving a comprehensive, yet brief exposition of Group Insurance, has been prepared for executives.

THE TRAVELERS INSURANCE COMPANY
Hartford

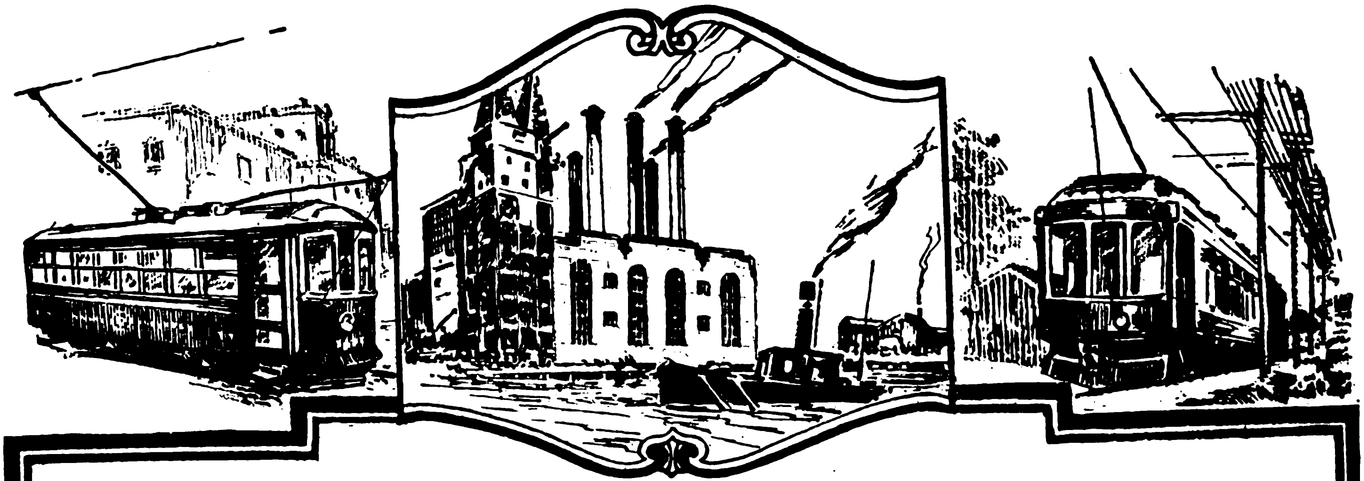


Send for your copy today. Have your stenographer write on your business letter-head. Your request will not obligate you in any way.

THE TRAVELERS INDEMNITY COMPANY
Connecticut

THE TRAVELERS

ACCIDENT, LIFE, LIABILITY, HEALTH AUTOMOBILE, STEAM BOILER, COMPENSATION, GROUP, BURGLARY, PLATE GLASS, AIRCRAFT, MACHINERY



Why
The "Guaranteed Mileage Contract"
is Passing

Only a few short years ago the majority of Street Railways were purchasing oils on the "guaranteed mileage" basis.

Now you have to go far afield to find roads which adhere to this antiquated method of buying oil.

The old method dropped out because of certain inherent weaknesses.

Of course, when the old system passed out it did so because something better took its place.

And we do not heistate to declare that the correctness of the Texaco plan was largely responsible for inaugurating this newer and better era in Street Railway lubrication.

The Texaco plan is based on

1—Supplying proper lubricants in the right amount.

2—Always regarding Lower Maintenance Cost as the goal for all economies.

3—Unstinted Engineering Service through experienced and capable Lubrication Engineers.

4—A degree of friendly cooperation you have never realized until you took up with Texaco.

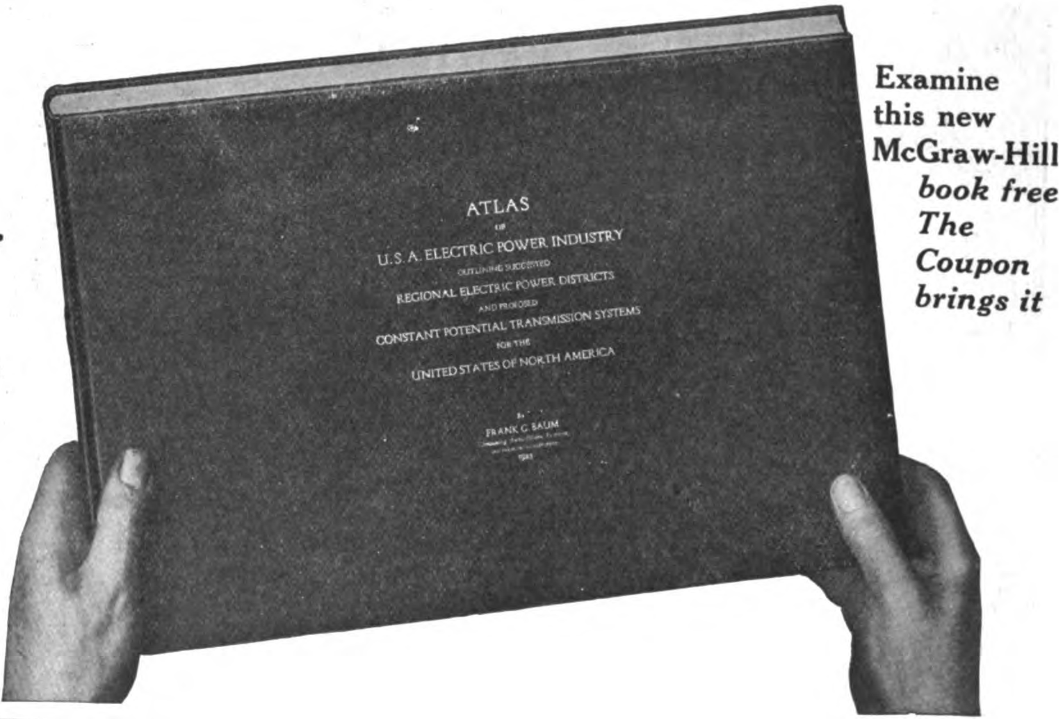
When do you want to take it up with us?

TEXACO THE TEXAS COMPANY TEXACO

[illegible]

A survey of this kind for the railroads would have saved millions of dollars. This work will mean a great deal to the electric power industry. Prove it to your own satisfaction by examining the book at our expense.

A
super-power
survey
of the whole
United
States


ATLAS
OF
U.S.A. ELECTRIC POWER INDUSTRY
OUTLINING SUGGESTED
REGIONAL ELECTRIC POWER DISTRICTS
AND PROPOSED
CONSTANT POTENTIAL TRANSMISSION SYSTEMS
FOR THE
UNITED STATES OF NORTH AMERICA
BY
FRANK G. BAUM

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Atlas of U.S.A. Electric Power Industry

By Frank G. Baum

Consulting Hydro-Electric Engineer

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Think of a super power survey of the whole United States presenting in text, charts, maps and graphs the facts of the power resources and the power demands of the whole country—offering a sound, logical economical program for the solution of the country's power problems.

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Problems of the Power Industry.
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Constant-Potential Electric Transmission System.
Outline of Proposed Constant-Potential Transmission System.
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Generator Capacity and Output of Central Stations.
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Mechanical and Electrical Power and Wage Earners in Manufactures.
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Railway Data and Discussion.
Effect of Diversity on Load Factor.
Economic Proportion of Hydro-Electric and Steam Power.

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Meritas Car Curtain Material is coated two sides. It does not fade, and regardless of the length of service does not become streaky. Sun and rain do not injure it, and it retains its flexibility and finish in the face of any conditions of weather or temperature.

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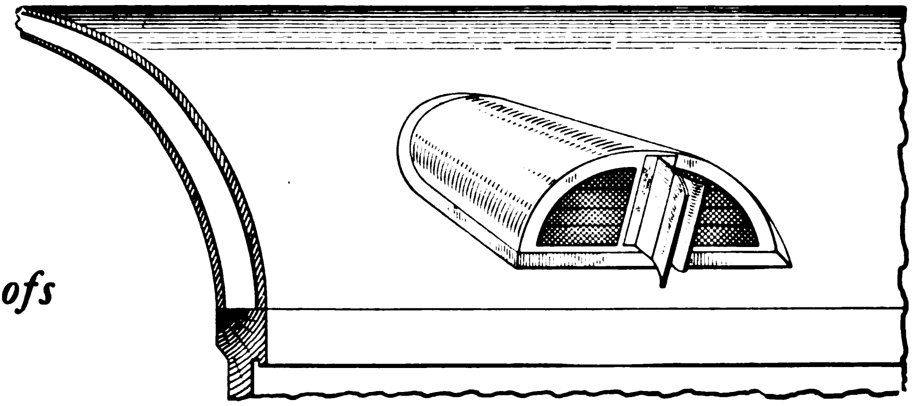

*For either arch
type or monitor
deck car roofs*

THE AUTOMATIC VENTILATOR

Now supplied exclusively by the Consolidated Car-Heating Co.

A combined intake and exhaust device long popular in the railway field.

Performs in one device, and at one time, the dual function of drawing in the proper amount of fresh air, and exhausting the foul air. Does it automatically and continuously, *without creating draughts* or noticeable air currents. Adjustable to meet extremes of weather conditions.

The Automatic Ventilator is an equipment of many years' reputable standing in the steam and electric railway field. Widely used in railway mail cars, because it so adequately meets the rigid specifications of the U. S. Post Office Department. Standard on many electric railway systems throughout the country.

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Suitable equipment and devices for properly controlling temperature and fresh air supply, will obviate many complaints.

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Thermostats
Automatic Ventilators

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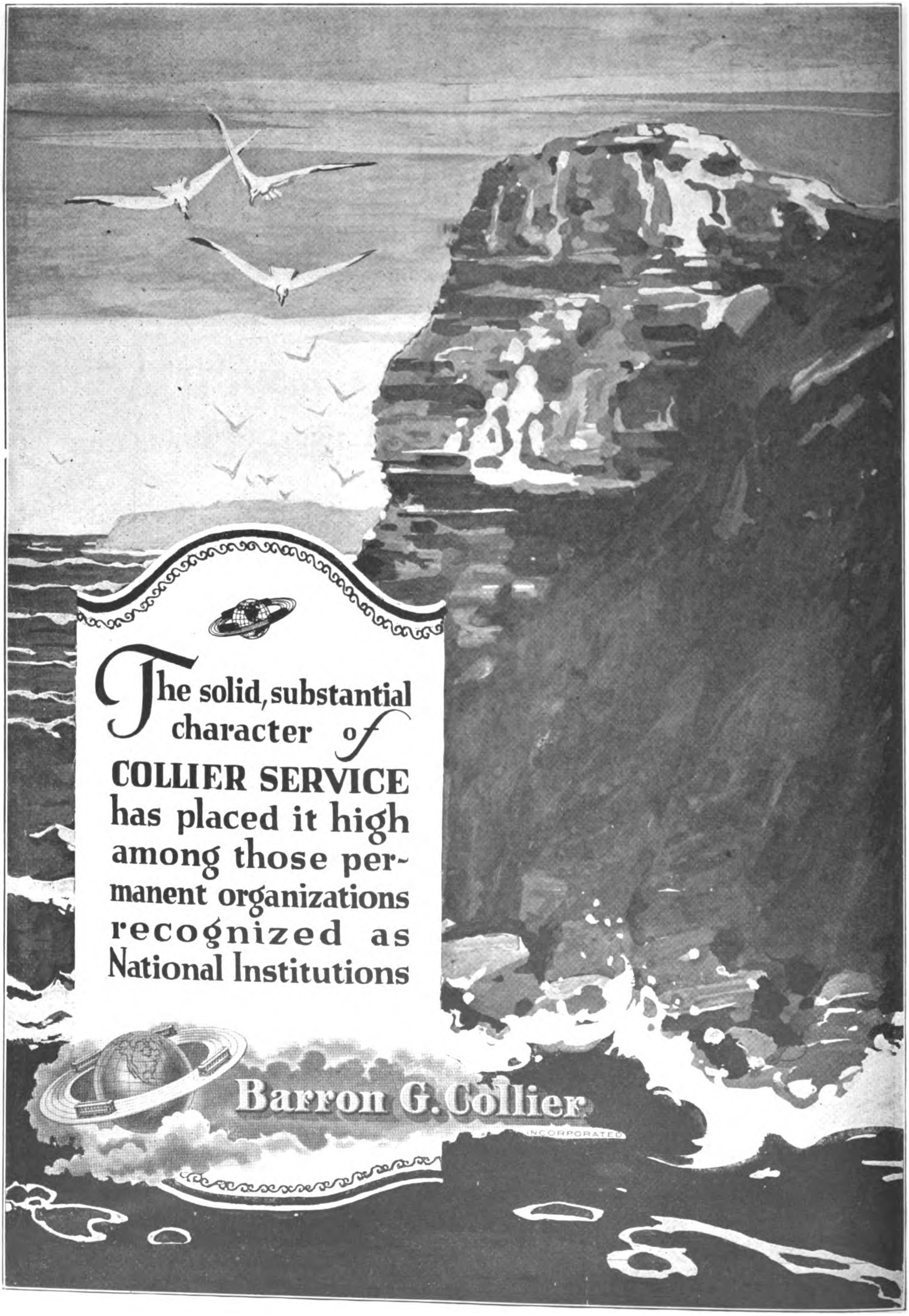

The solid, substantial character of COLLIER SERVICE has placed it high among those permanent organizations recognized as National Institutions

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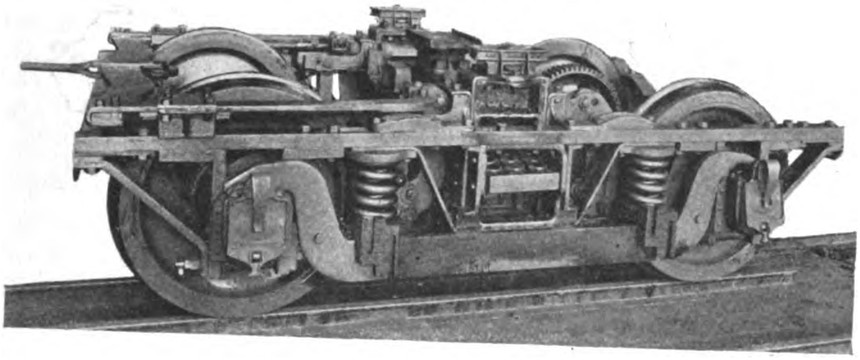
BALDWIN

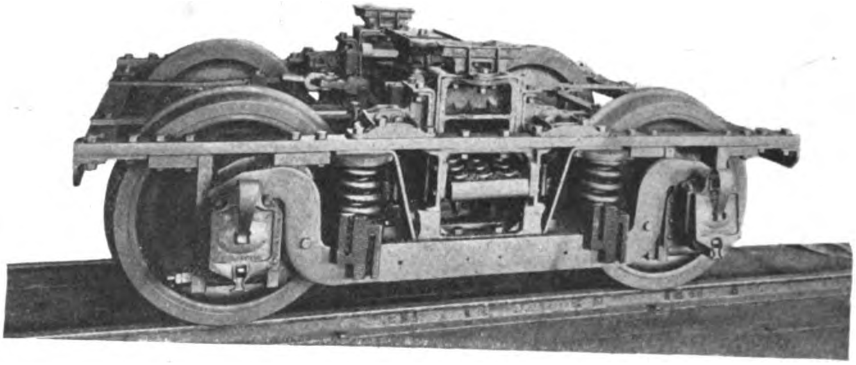
Northwestern Elevated Railroad

Uses Baldwin Type "A" Motor and Trailer Trucks



BALDWIN
Motor Truck
Class 78-30 A
Wheel base 78 inches
Center Pin Load
30,000 pounds.

BALDWIN
Trailer Truck
Class 66-30 AT
Wheel base 66 inches
Center Pin Load
30,000 pounds



Baldwin Motor and Trailer Trucks, in both this country and abroad, have won the highest commendations after being thoroughly tried out in high speed electric interurban and street railway service.

We recently delivered to the Northwestern Elevated Railroad of Chicago, one hundred each of the Type "A" trucks illustrated above.

All workmanship and materials used in their construction conform to specifications derived from many years experience in building locomotives.

For simplicity, strength and perfect riding qualities, these trucks and trailers cannot be excelled.

THE BALDWIN LOCOMOTIVE WORKS

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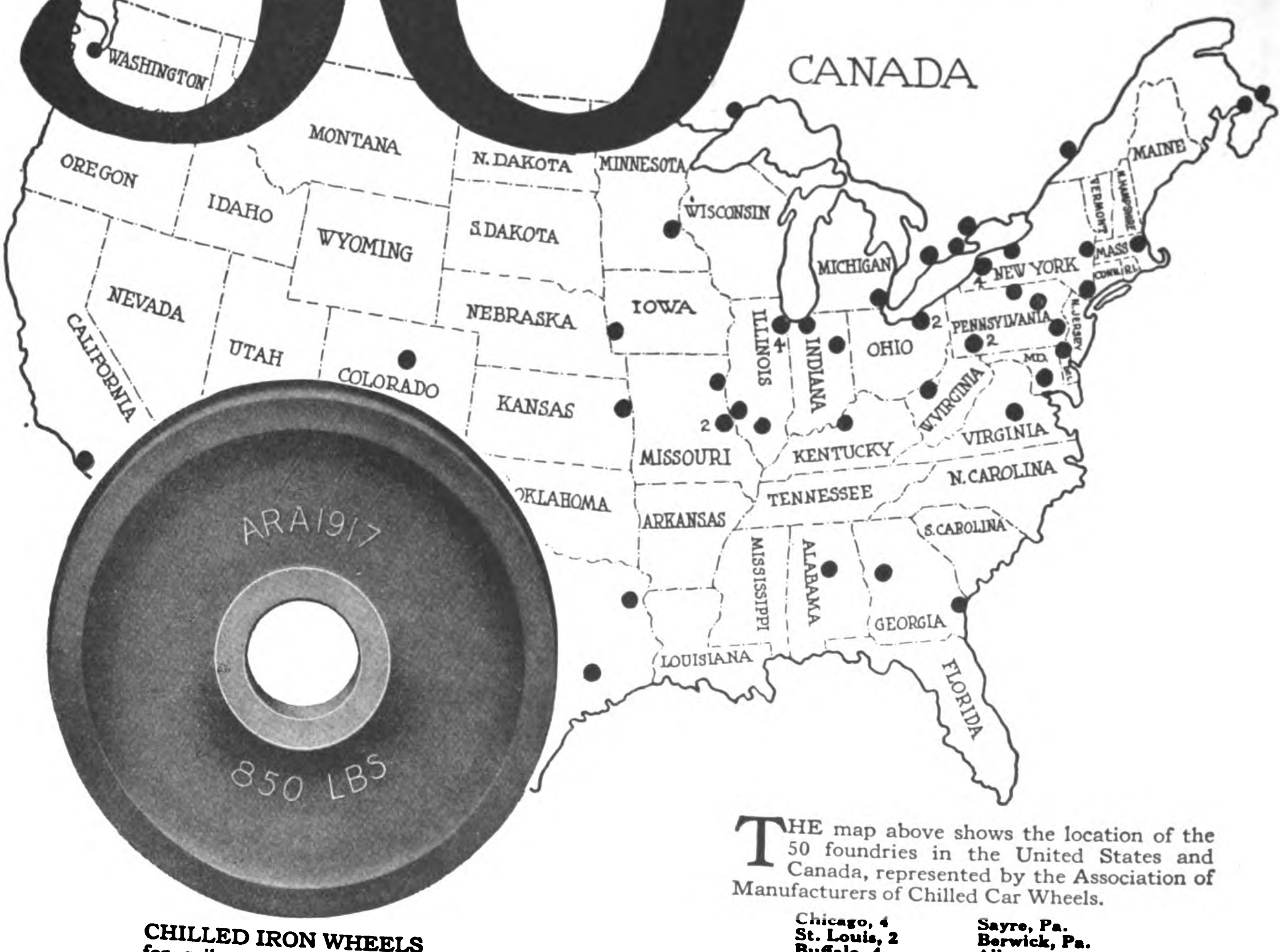
MOTOR TRUCKS

50 *Delivery Points*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N. CAROLINA
OKLAHOMA
ARKANSAS
TENNESSEE
S.CAROLINA
MISSISSIPPI
ALABAMA
GEORGIA
LOUISIANA
FLORIDA
4
2
2
2
4
2
ARA1917
850 LBS

THE map above shows the location of the 50 foundries in the United States and Canada, represented by the Association of Manufacturers of Chilled Car Wheels.

Chicago, 4
St. Louis, 2
Buffalo, 4
Pittsburgh, 2
Cleveland, 2
Amherst, N. S.
Montreal
Mich. City, Ind.
Louisville
Mt. Vernon, Ill.
Ft. Wayne, Ind.
Birmingham
Atlanta
Savannah
Boston
Detroit
St. Paul
Kansas City, Kan.
Denver
Tacoma
Rochester, N. Y.
Sayre, Pa.
Berwick, Pa.
Albany
Toronto
New Glasgow, N. S.
Madison, Ill.
Huntington, W. Va.
Wilmington, Del.
Houston, Tex.
Hannibal, Mo.
Reading, Pa.
Baltimore
Richmond, Va.
Ft. William, Ont.
St. Thomas
Hamilton
Ramapo, N. Y.
Marshall, Tex.
Los Angeles
Council Bluffs

CHILLED IRON WHEELS for railway and street car service. Capacity 20,000 per day. 25,000,000 in service.

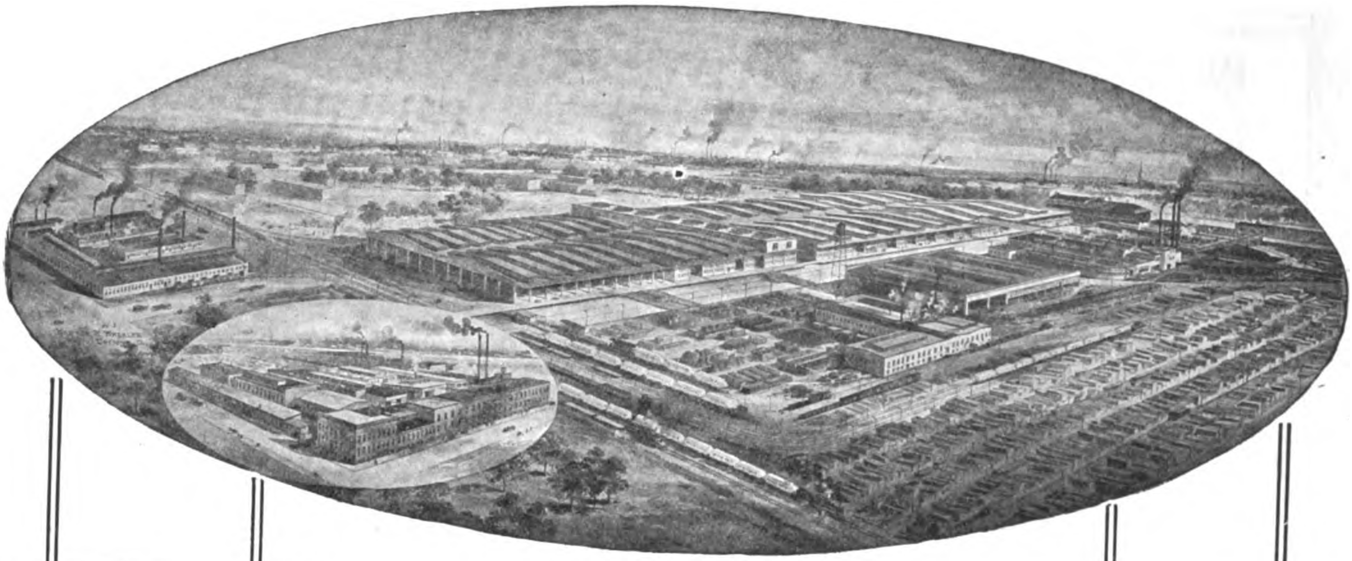
ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS
1847 McCormick Bldg., Chicago

American Railroad Association Standards

650 lb. wheel for 60,000 Capacity Cars
700 lb. wheel for 80,000 Capacity Cars
750 lb. wheel for 100,000 Capacity Cars
850 lb. wheel for 140,000 Capacity Cars

The Standard Wheel for Seventy-Two Years

CHILLED IRON WHEELS



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- City Cars
- Interurbans
- Safety Cars
- Motor Buses
- Trolley Buses

Qualified—

Qualified — by experience, size and established reputation to render "quality service" to electric railway companies.

Send for circulars.

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St. Louis, Mo.

"The Birthplace of the Safety Car"

"Quality" Equipment

- Trucks
- Forgings
- Castings
- Seats
- Rattan
- Metal Trim
- Curtains
- General Supplies

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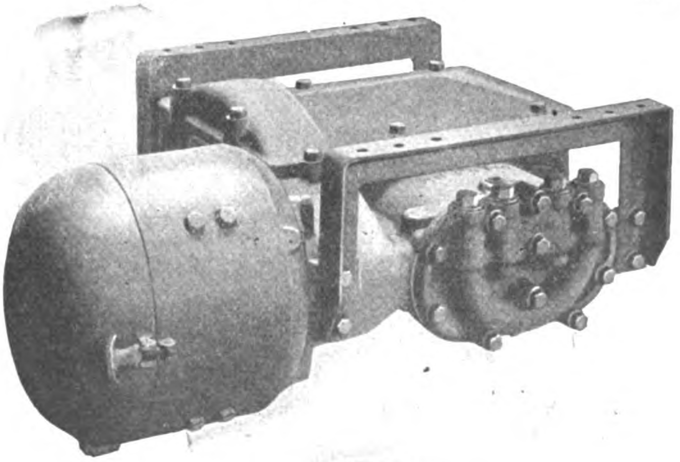
AA-7B Air Compressor



Compressor for Street Car Mounting

A single acting duplex compressor with crank case and cylinders integral. One-piece cylinder-head for both cylinders contains suction and discharge valves. Trunk pistons operated by connecting rods with bushings provided for taking up wear.

Heavily designed crankshaft of high-grade steel turns in journal bearings of ample proportions to insure minimum wear.

Herringbone Gears transmit power from motor shaft to crankshaft with practically silent operation.

Lubrication is positive and efficient. Connecting rods dip into the oil and splash reaches all working parts. Gears run in oil.

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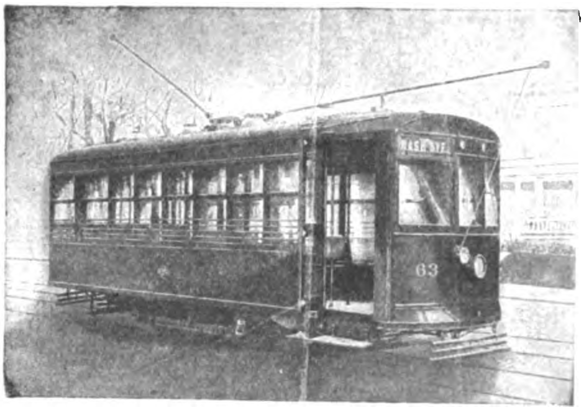
ALLIS-CHALMERS MANUFACTURING CO.

MILWAUKEE, WIS. U.S.A.



IS PERFECT SERVICE POSSIBLE?

We would hesitate to say "No," because we have seen perfection so nearly reached in so many items of equipment, and equipment after all is at least 50% of what is required for perfect service.

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We are trying faithfully to do our part in the march of progress, and we feel strongly that we can materially aid a number of roads because we have been serving the field for over thirty years and have developed many things which are now everyday necessities to electric traction.

We would *not* hesitate to predict that if the human factor keeps pace in improvement with the mechanical and electrical factors necessary to perfect service, the next few years will see as great improvements in electric service itself as are taking place in equipment.

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Every Gear Registered

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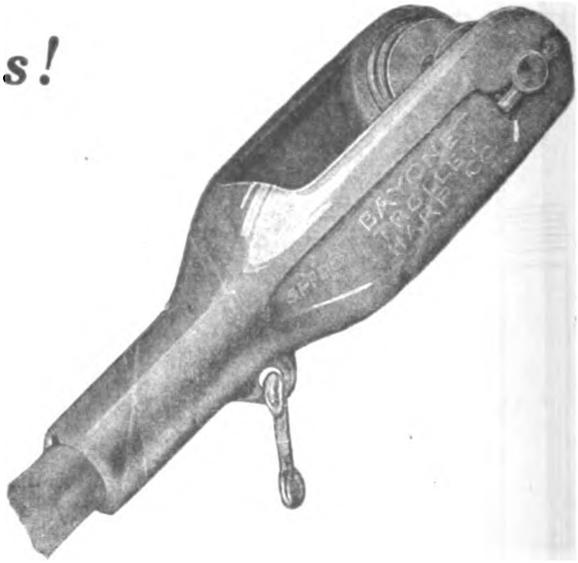
With Bayonet Detachable Harps, there is no need or incentive for running a wheel which needs some minor repair. That's the kind of business which shortens the life of equipment. Bayonet Equipment helps you to prolong its life.



Wheels
Sleet Cutters
Bases with Detachable Pole Clamps

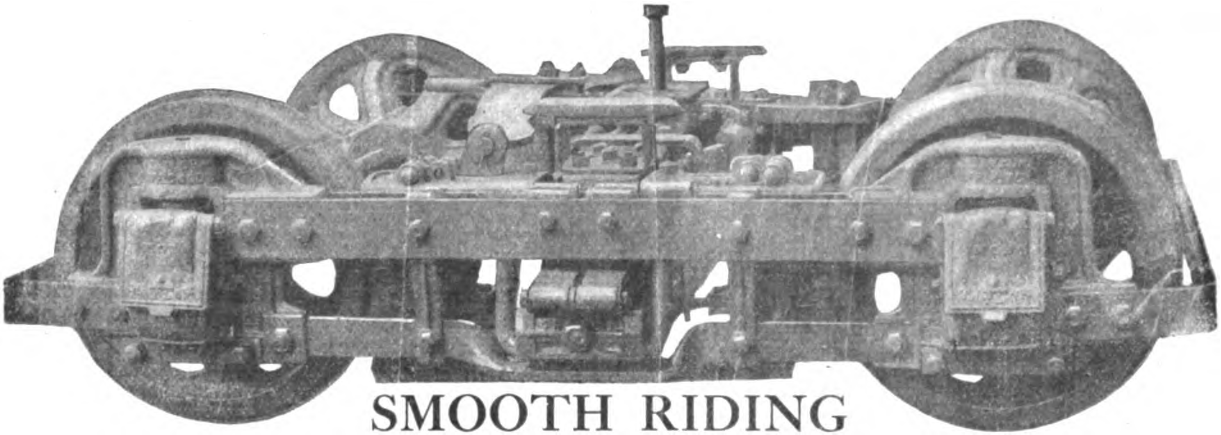
Bayonet Trolley Harp Co., Springfield, Ohio

R. H.

TAYLOR REDUCED HEIGHT TRUCK

S. WITH A.

TAYLOR STRAIGHT ACTION BRAKE



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LOW MAINTENANCE COST—Absolute Safety

Center Plate Height 22¾ in. with 26 in. Diam. Wheels

For Modern Low Level Double Truck Cars, the Taylor R. H. Truck, equipped with Taylor S. A. Brake, with large diameter hard steel pins, will provide the best possible service results from every standpoint.

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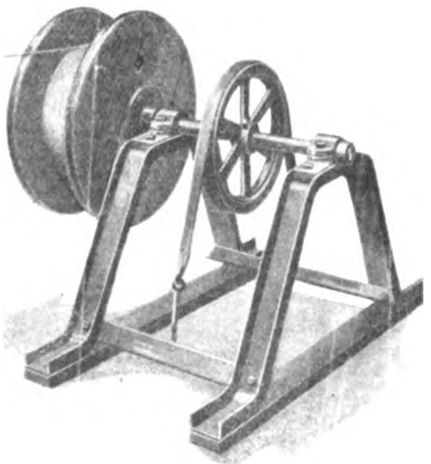

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No. 2

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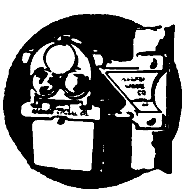

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PHILLIPSDALE, R.I.
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Incandescent Lamp Cord

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MAGNET WIRE

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Operating Mills in Southern Ohio

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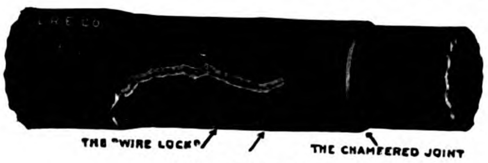

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Least Maintenance
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Standard in the Electric Industries for 35 years
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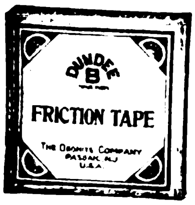

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THE OKONITE Co., Passaic, N. J.
Incorporated 1884
Sales Offices: New York—Atlanta—San Francisco
Agents: Central Electric Co., Chicago, Ill.; Pettingell-Andrews Co., Boston, Mass.; The F. D. Lawrence Electric Co., Cincinnati, Ohio; Novelty Electric Co., Philadelphia, Pa.
OKONITE
TRADE MARK
REG. U.S. PAT. OFFICE

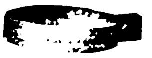
Chapman
Automatic Signals
Charles N. Wood Co., Boston

Standard Underground Cable Co.
Manufacturers of
Electric Wires and Cables of all kinds;
also Cable Terminals, Junction Boxes, etc.
Boston Philadelphia Pittsburgh Detroit New York
San Francisco Chicago Washington St. Louis

Lapp Insulators
Lapp Insulator Co. Inc. LeRoy, N.Y.
Trade Mark

ANACONDA
TROLLEY WIRE
ANACONDA COPPER MINING COMPANY
Conway Building, Chicago, Ill.
THE AMERICAN BRASS COMPANY
General Offices: Waterbury, Conn.

Hubbard Trolley Pole Bands



Are made to meet every requirement. Galvanized the Hubbard Way.

Solid
Split
HUBBARD & COMPANY
Pittsburgh
Chicago

THE BABCOCK & WILCOX COMPANY
85 LIBERTY STREET, NEW YORK

Builders since 1868 of Water Tube Boilers of continuing reliability

BRANCH OFFICES
BOSTON, 49 Federal Street
PHILADELPHIA, North American Building
PITTSBURGH, Farmers Deposit Bank Building
CLEVELAND, Guardian Building
CHICAGO, Marquette Building
CINCINNATI, Traction Building
ATLANTA, Candler Building
TUCSON, ARIZ., 21 So. Stone Avenue
DALLAS, TEX., 2001 Magnolia Building
HONOLULU, H. T., Castle & Cooke Building
PORTLAND, ORE., 805 Gasco Building

WORKS
Bayonne, N. J.
Barberton, Ohio

Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893

BRANCH OFFICES
DETROIT, Ford Building
NEW ORLEANS, 521-5 Baronne Street
HOUSTON, TEXAS, Southern Pacific Building
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 705-6 Kearns Building
SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, Royal Bank Building

WHARTON
Special Trackwork
For Street and Steam Railways

Steel Castings Gas Cylinders

ORIGINATORS OF
Manganese Steel Trackwork

WM. WHARTON JR. & CO., Inc.
Easton, Pa.
Other Plants:
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.
Tioga Steel & Iron Co., Philadelphia, Pa.
Philadelphia Roll & Machine Co., Philadelphia, Pa.

Lorain Special Trackwork
Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY
Johnstown, Pa.

Sales Offices:
Atlanta Chicago Philadelphia Cleveland Pittsburgh New York
Pacific Coast Representative:
United States Steel Products Company
Los Angeles Portland San Francisco Seattle
Export Representative:
United States Steel Products Company, New York, N. Y.

RAMAPO AJAX CORPORATION

Ramapo Automatic Return Switch Stands for Passing Sidings

RACOR
TRADE MARK

RACOR Tee Rail Special Work.

Manganese Construction

GENERAL OFFICES: HILLBURN, NEW YORK
Chicago New York Superior, Wis. Niagara Falls, N. Y.
Canadian Ramapo Iron Works, Ltd., Niagara Falls, Ont.

BUCKEYE JACKS
High-grade R. R. Track and Car Jacks

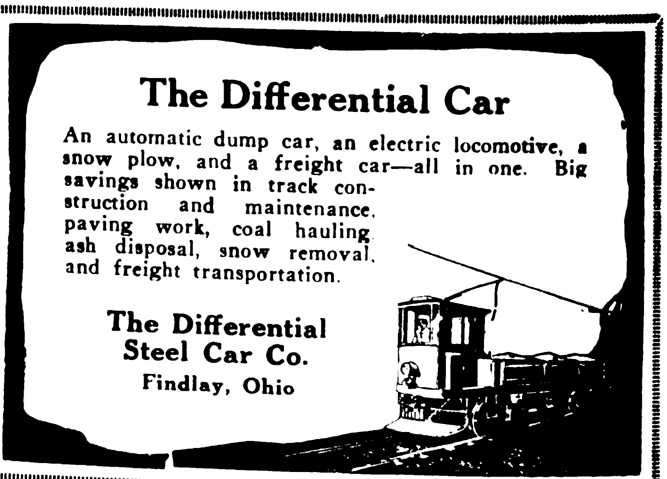
The Buckeye Jack Mfg. Co.
Alliance, Ohio

Series Type
Arc Welding and Bonding Outfit

Rugged series resistance coil
Indestructible Mica insulation
Normal welding current at half voltage

The Electric Railway Improvement Co.
Cleveland, Ohio

ERICO RAIL BONDS



The Differential Car

An automatic dump car, an electric locomotive, a snow plow, and a freight car—all in one. Big savings shown in track construction and maintenance, paving work, coal hauling, ash disposal, snow removal, and freight transportation.

The Differential Steel Car Co.
Findlay, Ohio

Metal Safety Railway Tie Co.
522 North American Bldg., Philadelphia, Pa.

All-metal cross ties
Types for open and closed tracks
"More flexible than wood"

See advertisement, issue, Sept. 29, page 86.
Ask for circular on either type. *Prices upon application.*

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

REG. U.S. PAT. OFF.
TRADE
HOPE
MARK
MADE IN U.S.A.

The

Standard of Quality

The precise and delicate requirements of manufacturers of dynamos, magnetos and other electrical apparatus prescribe the use of electric tape that is known to be of constant high quality.

Quality is the sum total of good basic materials and careful manufacture—the best grades of yarn plus painstaking, skilled workmanship.

That is why thickness, width, weave, finish and absorption are uniformly correct in HOPE tapes. That is why, for 40 years, manufacturers of electrical apparatus have found HOPE products to be the Standard of Quality.

Let us send you the HOPE Sample Booklet of electric tape, so that you can pick out a tape to meet your own special requirements.

HOPE Electric Tape

HOPE WEBBING COMPANY, INC.
PROVIDENCE - RHODE ISLAND
New York Troy Chicago

Now Fully Electrified

193
IN
THE INTERNATIONAL REGISTER CO.
CHICAGO
10224

Typ R-10

The essentials of accuracy and durability have been worked out in International Registers so well that they are admittedly the standard equipment by which all types are judged. The newest developments in fare boxes, partly and completely automatic, find a parallel development in the International Registers, single or double, now equipped fully for electric as well as hand operation.

The International Register Co.
15 South Throop Street, Chicago, Illinois
General Selling agents for HEEREN Enamel Badges

Awebco
ANCHOR WEBBING COMPANY

Use only Awebco Tape on your Armatures
Field Coils have better protection when wound with "AWEBCO Tape." Send for samples.

ANCHOR WEBBING COMPANY
300 Brook Street, Pawtucket, Rhode Island

DIXON
SILICA
GRAPHITE
FOUR C
JOSEPH DIXON CR
JERSEY CITY

DIXON'S
Silica Graphite Paint

has for many years afforded better protection and complete satisfaction to its many users. Records from various fields tell of service of from five to ten years without repainting.

It will pay you to write NOW for Booklet No. 180-B telling why Dixon's is better.

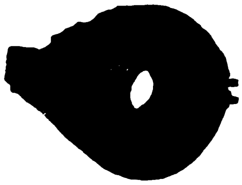
JOSEPH DIXON
CRUCIBLE CO.
Jersey City, N. J.
Est. 1827

FORD TRIBLOC

A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only block that carries a five-year guarantee

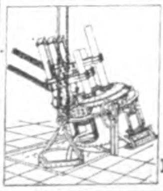
FORD CHAIN BLOCK CO.
Second and Diamond Sts., Philadelphia

OXYGEN
FOR CUTTING, WELDING, ETC.
INTERNATIONAL OXYGEN COMPANY
NEWARK NEW YORK PITTSBURGH TOLEDO



CHILLINGWORTH
One-Piece Gear Cases
Seamless—Rivetless—Light Weight
Best for Service—Durability and Economy. *Write Us.*

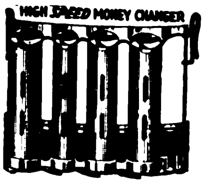
Chillingworth Mfg. Co.
Jersey City, N. J.



Moore Rapid Lectromelt Furnaces
Ten Standard Sizes 1/16 to 24 Tons Capacity
Most Rapid and efficient for making
Tool Steels, Alloy Steels, Forging Steels
Steel Castings, Malleable Iron, Grey Iron
Carbide, Ferro-Alloys etc.
PITTSBURGH ELECTRIC FURNACE CORPORATION
P.O. Box 1125. PITTSBURGH, PA.

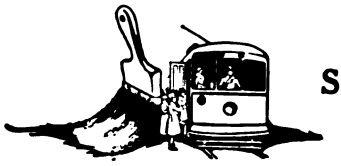
An Independent Inspection Service
For Electric Railways
Embracing
Progressive Inspection of Cars, Rails, Track Fastenings, etc., from the raw material to the finished product. Our Bulletin No. 26 tells the story—*write for your copy.*
Pittsburgh Testing Laboratory
Inspecting Engineers and Chemists
Branch Offices in the Principal Cities **Pittsburgh, Pa.**

HIGH SPEED MONEY CHANGERS
1923 model —without rivets— ready for delivery
Supplied in one or four tube Combinations



Essential wherever the rapid and accurate handling of change is required. Now included in the standard equipment of largest Traction Companies because conductors demand them.
Prices and Literature sent on request
J. L. GALEF, 75 Chambers St., N. Y. C.
Exclusive Manufacturer's Selling Agent

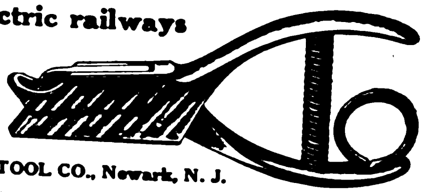
Fare Boxes *Change Carriers*
COIN
COUNTERS SORTERS WRAPPERS
THE CLEVELAND FARE BOX CO.
CLEVELAND, OHIO
Canadian Branch, Preston, Ontario.



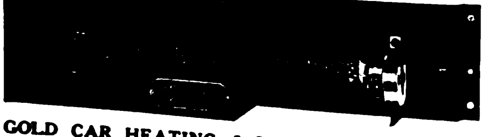
PAINT
Sells Transportation
Let our experts on railway car finishing demonstrate Beckwith Chandler paints and varnishes. Write for details.
Beckwith-Chandler Co., 203 Emmett St., Newark, N. J.

PS HEATERS
Car Heating and Ventilation
are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.
The Peter Smith Heater Company
6209 Hamilton Ave., Detroit, Mich.

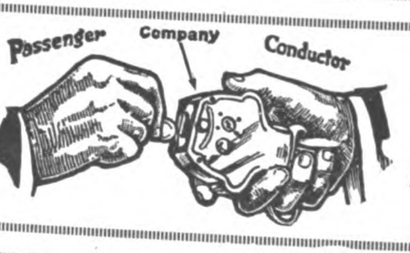
75% of the electric railways
use
B-V Punches
Send for Catalog
BONNEY-VEHSLAGE TOOL CO., Newark, N. J.



THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



No. 478E
GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.



Direct Automatic Registration By the Passengers
Rooke Automatic Register Co.
Providence, R. I.

PROVIDENCE FENDERS H-B LIFE GUARDS
The Consolidated Car Fender Co., Providence, R. I.
Wendell & MacDuffie Co., 110 E. 42nd St., New York
General Sales Agents

Heywood-Wakefield
CAR SEATS
of pressed Steel for all Classes of Passenger Service. Rattan for covering seats and for snow sweepers.
HEYWOOD-WAKEFIELD CO.
Factory at Wakefield, Mass.
Offices at New York, Chicago, San Francisco
For detailed description —see— CAR BUILDERS CYCLOPEDIA 1922 Edition

"Boyerized" Products Reduce Maintenance
Bemis Trucks
Case Hardened Brake Pins
Case Hardened Bushings
Case Hardened Nuts and Bolts
Manganese Brake Heads
Manganese Transom Plates
Manganese Body Bushings
Bronze Axle Bearings
Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.
Bemis Car Truck Co., Springfield, Mass.

HALE-KILBURN
CAR SEATS
For Every Class of Service
General Offices and Works: Philadelphia
Offices: New York, Chicago, St. Louis, Washington, San Francisco

B. A. Hegeman, Jr., President Charles C. Castle, First Vice-President
Harold A. Hegeman, Vice-President, Treas. and Acting Sec'y
W. C. Lincoln, Manager Sales and Engineering

National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., New York

BRANCH OFFICES:
Munsey Bldg., Washington, D. C.; 100 Boylston St., Boston, Mass.; Hegeman-Castle Corporation, Railway Exchange Bldg., Chicago, Ill.

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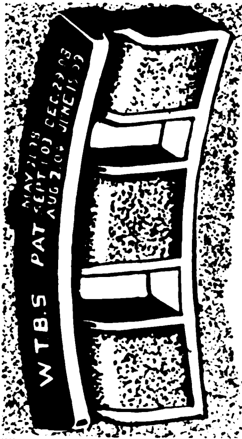
Tool Steel Gears and Pinions
Pittsburgh Forge & Iron Co.'s Products
Anglo-American Varnish Co., Varnishes, Enamels, etc.
National Hand Holds
Drew Line Material and Railway Specialties
Genesco Paint Oils
Turnstile Car Corporation Turnstiles
Economy Electric Devices Co.,
Power Saving & Inspection Meters
Fort Pitt Spring & Mfg. Co., Springs
C-H Electric Heaters
Garland Ventilators
E-Z Car Control Corporation Safety Devices
Lind Aluminum Field Coils
Flaxlinum Insulation
National Safety Car Equipment Co.'s One-Man Safety Cars
Anderson Slack Adjusters

TAKE
ONE
T.L.T.

An Ohmer One Man Car Installation

Ohmer Indicating and Recording Fare Registers apply correct business methods to the sale of electric railway transportation.

OHMER FARE REGISTER CO.
Dayton, Ohio



Defective Wheels Corrected While They Run

WHEEL TRUING BRAKE SHOES

—keep your cars and wheels in service. Abrasive blocks in various sections correct flattening or wear on any part of flange or tread. Write for booklet.

Wheel Truing Brake Shoe Co.
Detroit, Mich.

Trade Mark—Wheel Truing Brake Shoe

VELOX
WHY NOT TRY
A GILBERT & SONS B.F. CO.
ST. LOUIS, MO.
U.S.A.
BRONZE

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

100 New Users in the Last Nine Months
KASS SAFETY TREADS
HIGH
in efficiency and lasting qualities
LOW
in weight, initial and upkeep costs
Morton Manufacturing Co., Chicago

STEEL
'CARNEGIE'

Only reliable products can be continuously advertised

"OSKELITE"

The Stop Light for street cars. Operates from brake system. Details on request

The Oskel Equipment Co.
940 McCormick Bldg., Chicago, Ill.

Brake Shoes
A.E.R.A. Standards

Diamond "S" Steel Back is the Best Type

Standard Patterns for

SAFETY CAR

D-67 for Narrow Tread
D-87 for Wide Treads

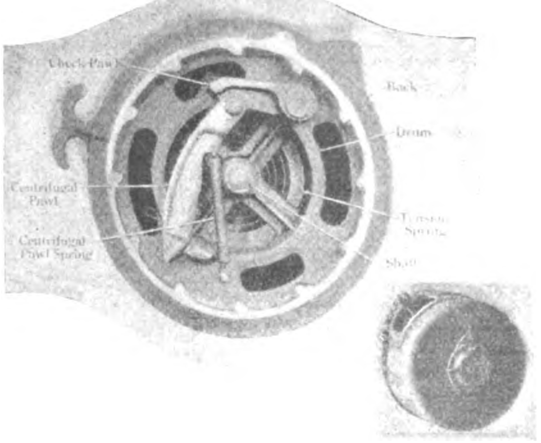
American Brake Shoe and Foundry Co.
30 Church Street, New York
332 So. Michigan Ave., Chicago Chattanooga, Tenn.

With a low price and extravagant promises, anyone can sell once.

"Tool Steel" gears sell regularly.

Tool Steel Quality

The Tool Steel
Gear and Pinion Co.
CINCINNATI, O.



All new catchers are good—

But when they wear so that the pole is checked too late they're junk. The short fat check pawl of

Earll Catchers and Retrievers

engages full face-on. No points or edges to wear or batter. Even aged Earlls check the pole as promptly as when new. Throughout an almost endless life they always operate promptly—another one of the five exclusive Earll Catcher and Retriever Features.

Like to know the other four? We'd like to tell you

C. I. Earll York, Pa.

Canadian Agents:
Railway & Power Engineering Corp., Ltd., Toronto, On
In All Other Foreign Countries:
International General Electric Co., Schenectady, N.

Griffin Wheel Company
McCormick Building
Chicago, Ill.

GRIFFIN
F. C. S.
WHEELS

For Street and Interurban Railways

FOUNDRIES:

Chicago	Boston	St. Paul
Detroit	Kansas City	Los Angeles
Denver	Council Bluffs	Tacoma

SEARCHLIGHT SECTION

EMPLOYMENT-BUSINESS OPPORTUNITIES-EQUIPMENT

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

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1 to 3 inches	$4.50 an inch
4 to 7 inches	4.30 an inch
8 to 14 inches	4.10 an inch

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

E. R. J.

POSITIONS VACANT

ACCOUNTANT, experienced in electric railway accounting and capable of assuming full control of all accounting work for small electric railway. State present and former connections, present salary and salary desired and reason for change. Communications will be treated confidentially. P-612, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

COMPETENT general superintendent wanted, age between 30 and 45 years, City system, about 30 miles of track, location, Williamsport, Pa. Give full outline of experience, references and salary desired first letter. P. O. Box 371, Williamsport, Pa.

SUPERVISOR of roadway and structures wanted for electric road in the East; must be thoroughly experienced in the maintenance of city and interurban track and competent in the supervision of overhead construction. State experience, salary expected and when available. P-615, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

POSITIONS WANTED

ENGINEER of equipment, technical graduate, with several years' experience. PW-616, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

MR. MANAGER, are you in the field for a superintendent of transportation? If so, you should realize that practical experience is an important factor in the successful handling of this department. The writer of this ad has a proven successful record of nineteen years on city, suburban and interurban properties and can furnish high grade refeernces as to character and ability to get results on any property regardless of size or condition of same; at present with large property; personal reasons for making a change. PW-617, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

POSITIONS WANTED

POSITION wanted, with small road in Penna. or N. Y., as working barn foreman or general repair work. With chance of promotion. Twenty-six years old, eight years' experience. Reference. PW-614, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

SUPERINTENDENT of equipment or master mechanic having wide experience and ability in maintenance of all types of equipments, open for immediate employment. PW-613, Elec. Railway Journal, Real Estate Trust Bldg., Phila., Pa.

FOR SALE

TRANSFORMERS

3—New 200 kva., 60-cy., single phase, 13200/2300-v. General Electric **Transformers,** complete with oil. Immediate delivery.

THE TOLEDO & INDIANA RAILROAD CO.
714-718 Washington St., Toledo, Ohio

A. S. C. E. 85s

We can supply up to 500 tons new 85-lb. **Rails**, first quality, standard lengths, with necessary angle bars.

HENRY LEVIS & CO.
Commercial Trust Bldg., Philadelphia.

FOR SALE

50—G. E. No. 80-A Motors.
50—Controllers, K-28-B; K-12.
35—B-2 Compressors.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

Good Relaying Rails

Are as Serviceable as New Rails, with a Big Saving on the Price

We have ready for prompt shipment First-Class Relaying Rails in various weights. Get in touch with us, stating what weight rail and tonnage desired, and we will submit quotations.

HYMAN-MICHAELS COMPANY
531 Peoples Gas Bldg., Chicago
OFFICES AND PLANTS AT
St. Louis, Mo. Detroit, Mich.
Pittsburgh, Pa.
1324 Woolworth Bldg., New York City.
San Francisco, Cal. McKees Rocks, Pa.

BARGAIN

12 sets Brill 27-G-1 Trucks, 4 ft. 6 in. wheel base, 4¼ and 4½ in. axles, unusually good condition. Price per set $125.00 f.o.b. cars Western shipping point.

Transit Equipment Co.
Motors *Cars*
501 Fifth Ave., New York

The Buyer
The Employer

The Agent
The Seller

The Employee
The Dealer

You can reach them all through the

SEARCHLIGHT SECTION

"Searchlight" ads are quick acting. They usually bring prompt returns. There is no better way to reach the men of this industry at small cost.

For Every Business Want *"Think* SEARCHLIGHT *First"*

0135

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.
Air Receivers, Aftercoolers
Ingersoll-Rand Co.
Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.
Armature Shop Tools
Elec. Service Supplies Co.
Automatic Return Switch Stand
Ramapo Ajax Corp.
Automatic Safety Switch Stands
Ramapo Ajax Corp.
Axles
Bemis Car Truck Co.
St. Louis Car Co.
Axles, Bus
Timken-Detroit Axle Co.
Axle Straighteners
Columbia M. W. & M. I. Co.
Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.
Babbitting Devices
Columbia M. W. & M. I. Co.
Badges and Buttons
Elec. Service Supplies Co.
International Register Co., The
Barges, Steel
Amer. Bridge Co.
Batteries, Dry
Nichols-Lintern Co.
Bearings and Bearing Metals
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
A. Gilbert & Sons, B. F. Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.
Bearings, Center and Roller Side
Baldwin Locomotive Wks.
Stucki Co., A.
Bearings, Roller
Stafford Roller Bearing Car Truck Corp.
Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Heating Co.
Elec. Service Supplies Co.
Benders, Rail
Railway Track-work Co.
Boiler Tubes
Nat'l Tube Co.
Boilers
Babcock & Wilcox Co., The
Bond Testers
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Railway Track-work Co.
Bonds, Rail
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse Elec. & M. Co.
Book Publishers
McGraw-Hill Co.
Brackets and Cross Arms (See also Poles, Ties, Posts etc.)
American Bridge Co.
Bates Exp. Steel Truss Co.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.
Brake Adjusters
Nat'l Ry. Appliance Co.
Westinghouse Tr. Br. Co.
Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Taylor Electric Truck Co.
Wheel Truing Brake Shoe Co.
Brakes, Brake Systems and Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Taylor Electric Truck Co.
Westinghouse Tr. Br. Co.
Bridges & Buildings
American Bridge Co.
Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse Elec. & M. Co.
Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Brushes, Wire Pneumatic
Ingersoll-Rand Co.
Bunkers, Coal
American Bridge Co.
Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.
Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
Cables
(See Wires and Cables)
Cambric Tapes, Yellow & Black Varnish
Irvington Varnish & Ins. Co.
Carbon Brushes
(See Brushes, Carbon)
Car Lighting Apparatus
Elec. Service Supplies Co.
Car Panel Safety Switches
Consolidated Car Heating Co.
Westinghouse Elec. & M. Co.
Cars, Dump
Differential Steel Car Co., Inc.
St. Louis Car Co.
Cars, Gas Rail
St. Louis Car Co.
Cars, Passenger, Freight Express, etc.
American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
National Ry. Appliance Co.
St. Louis Car Co.
Thomas Car Works Perley A.
Wason Mfg. Co.
Cars, Second Hand
Electric Equipment Co.
Transit Equipment Co.
Cars, Self-Propelled
General Electric Co.
Castings, Brass, Composition or Copper
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Castings, Funnel
Wharton, Jr. & Co., Inc., Wm.
Castings, Gray Iron and Steel
American Bridge Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Wharton, Jr., & Co., Inc., Wm.
Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Catchers and Retrievers, Trolley
Earll, C. I.
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.
Catenary Construction
Archbold-Brady Co.
Change Carriers
Cleveland Fare Box Co.
Galef, J. L.
Circuit Breakers
General Electric Co.
Westinghouse Elec. & M. Co.
Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. M. & J. M.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
WestinghouseElec . & M. Co.
Cleaners and Scrapers, Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.
Clusters and Sockets
General Electric Co.
Coal and Ash Handling (See Conveying and Hoisting Machinery)
Coils, Armature and Field
Columbia M. W. & M. I. Co.
Economy Elec. Devices Co.
General Electric Co.
Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
Westinghouse Elec. & M. Co.
Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Coin-Counting Machines
Cleveland Fare Box Co.
Galef, J. L.
International Register Co. The
Coin Sorting Machines
Cleveland Fare Box Co.
Galef, J. L.
Coin Wrappers
Cleveland Fare Box Co.
Galef, J. L.
Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Commutator Truing Devices
General Electric Co.
Commutators or Parts
Cameron Elec'l Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.
Compressors, Air, Portable
Ingersoll-Rand Co.
Compressors, Gas
Ingersoll-Rand Co.
Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll Rand Co.
Westinghouse Elec. & M. Co.
Condensor Papers
Irvington Varnish & Ins. Co.
Conduits, Underground
Std. Underground Cable Co.
Connectors, Solderless
Westinghouse Elec. & M. Co.
Connectors, Trailer Car
Consolidated Car Heating Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Controllers or Parts
Allis-Chalmers Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Controller Regulators
Electric Service Supplies Co.
Controlling Systems
General Electric Co.
Westinghouse Elec. & M. Co.
Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Conveying and Hoisting Machinery
Columbia M. W. & M. I. Co.
Copper Wire
Anaconda Copper Mining Co.
Rome Wire Co.
Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roeblings Sons Co., John A.
Samson Cordage Works
Cord Connectors and Couplers
Electric Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.
Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Tr. Br. Co.
Cranes
Allis-Chalmers Mfg. Co.
Cross Arms (See Brackets)
Crossings
Ramapo Ajax Corp.
Crossing Foundations
International Steel Tie Co.
Crossing Frogs and Switches
Ramapo Ajax Corp.
Wharton, Jr., & Co.,Inc.,Wm.
Crossings, Manganese
Indianapolis Switch & Frog Co.
Ramapo Ajax Corp.
Crossing Signals .See Signal Systems, Highway Crossing)
Crossings, Track, (See Track, Special Work)
Crossings, Trolley
Ohio Brass Co.
Crushers, Rock
Allis-Chalmers Mfg. Co.
Curtains and Curtain Fixtures
Brill Co., The J. G.
Edward Co., Inc., The O. M.
Electric Service Supplies Co.
Morton Mfg. Co.
Dealers' Machinery
Electric Equipment Co.
Transit Equipment Co.
Derailing Switches, Tee Rail
Ramapo Ajax Corp.
Destination Signs
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Detective Service
Wish Service, P. Edward
Door Operating Devices
Consolidated Car Heating Co.
National Pneumatic Co., Inc.
Doors and Door Fixtures
Brill Co., The J. G.
General Electric Co.
Hale & Kilburn Corp.
St. Louis Car Co.
Doors, Folding Vestibule
National Pneumatic Co., Inc.
Draft Rigging, (See Couplers)
Drills, Rock
Ingersoll-Rand Co.
Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.
Ingersoll-Rand Co.
Ohio Brass Co.
Dryers, Sand
Electric Service Supplies Co.
Ears
Ohio Brass Co.
Electric Grinders
Railway Track-work Co.
Electrodes, Carbon
Indianapolis Switch & Frog Co.
Railway Track-work Co.
Electrodes, Steel
Indianapolis Switch & Frog Co.
Railway Track-work Co.
Electrical Wires and Cables
American Elec. Works
Roeblings Sons Co., J. A.
Enamels
Beckwith-Chandler Co.
Engineers, Consulting, Contracting and Operating
Allison & Co., J. E.
Archbold-Brady Co.
Arnold Co., The
Beeler, John A.
Bibbens, J. Rowland
Buchanan & Laying
Byllesby & Co., H. M.
Day & Zimmerman, Inc.
Drum & Co., A L.
Feustel, Robert M.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelly Cooke & Co.
Ong, Joe R.
Parsons, Klapp, Brinkerhoff & Douglas
Richey, Albert S.
Sanderson & Porter
Sangster & Co., A.
Shaw, Henry M.
Stevens & Wood, Inc.
Stone & Webster
Wortham, Edwin
Engineers, Inspecting & Chemists'
Pittsburgh Testing Lab.
Engines, Gas, Oil and Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse Elec. & M. Co.
Expansion Joints, Track
Wharton, Jr., & Co., Inc., Wm.
Fare Boxes
Cleveland Fare Box Co.
Economy Elec. Devices Co.
Galef, J. L.
Nat'l Ry. Appliance Co.
Ohmer Fare Register Co.
Fences, Woven Wire and Fence Posts
Amer. Steel & Wire Co.
Fenders and Wheel Guards
Brill Co., The J. G.
Consolidated Car Fender Co.
Electric Service Sup. Co.
Star Brass Works
Fibre and Fibre Tubing
Westinghouse Elec. & M. Co.
Field Coils (See Coils)
Flangeway Guards
Godwin Co., Inc., W. S.
Flaxlinum Insulation
Nat'l Ry. Appliance Co.
Floodlights
Electric Service Sup. Co.
Forgings
Carnegie Steel Co.
Columbia M. W. & M. I. Co.
Frogs & Crossings, Tee Rail
Ramapo Ajax Corp.
Frogs, Track, (See Track Work)
Frogs, Trolley
Ohio Brass Co.
Furnaces, Electric
American Bridge Co.
Pittsburgh Electric Furnace Corp
Fuses and Fuse Boxes
Columbia M. W. & M. I. Co.
Consolidated Car Heating Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Fuses, Refillable
Columbia M. W. & M. I. Co.
General Electric Co.
Gaskets
Westinghouse Tr. Br. Co.
Gas-Electric Cars
General Electric Co.
Gas Producers
Westinghouse Elec. & M. Co.
Gates, Car
Brill Co., The J. G.
Gear Blanks
Carnegie Steel Co.
Gear Cases
Chillingworth Mfg. Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Westinghouse Elec. & M. Co.
Gears and Pinions
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.
Generating Sets, Gas-Electric
General Electric Co.
Generators
Allis-Chalmers Mfg. Co.
English Electric Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Girder Rails
Lorain Steel Co., The
Goggles, Safety
Indianapolis Switch & Frog Co.
Gongs (See Bells and Gongs)
Greases (See Lubricants)
Grinders and Grinding Supplies
Indianapolis Switch & Frog Co.
Railway Track-work Co.
Grinders, Portable
Railway Track-work Co.
Grinders, Portable Electric
Railway Track-work Co.
Grinding Blocks and Wheels
Railway Track-work Co.
Guard Rail Clamps
Ramapo Ajax Corp.
Guard Rails, Tee Rail & Manganese
Ramapo Ajax Corp.
Guards, Cattle
American Bridge Co.
Guards, Trolley
Electric Service Sup. Co.
Ohio Brass Co.
Hammers, Pneumatic
Ingersoll-Rand Co.
Harps, Trolley
Anderson M. Co., A. & J. M.
Bayonet Trolley Harp Co.
Electric Service Sup. Co.
Nuttall Co., R. D.
Star Brass Works
Thornton Trolley Wheel Co.
Headlights
Electric Service Sup. Co.
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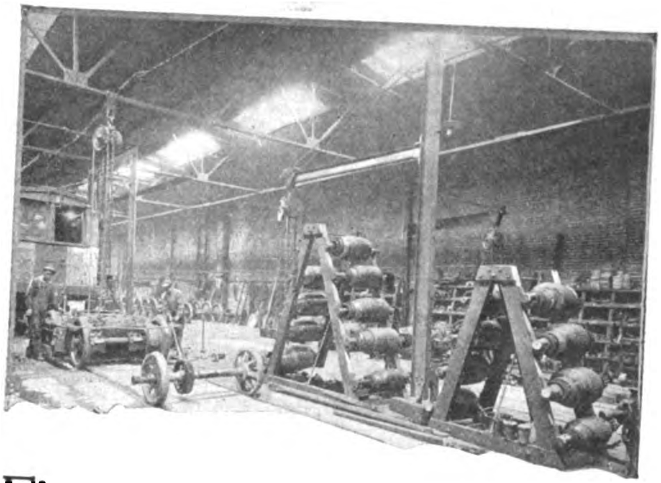
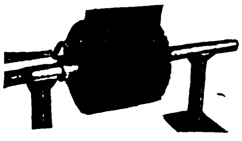


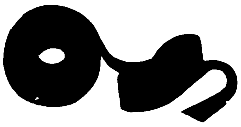
Fix up those armatures— use the Irvington Specification

Irv-O-Slot



It's a simple thing to lay down a piece of combination slot insulation (cut to specification) and insert the coil or coils. Irvington slot insulation is made up of a layer of varnished cambric and a layer of fibrous paper solidly cemented together with a flexible, insulating compound that will not dry out.

Seamless Bias Tape

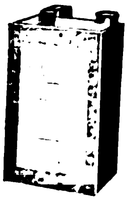


Irvington Seamless Bias Tape is better. Every inch is effective insulation of uniform thickness. It makes smooth windings. It also can be applied with taping machines.

Furnished in Yellow and Black .007 in. to .015 in. thick, ½ in. to 36 in. wide, on paper cores ⅜ in. or 1⅜ in. hole, standard length rolls, 36 and 72 yds.

Try it once and see how it cuts winding costs. Send for samples and prices.

Varnishes



Black baking insulation varnish is a good one for armature and field coils—magnet coils, etc. It is a most elastic and durable varnish. Can be thinned with benzine. Moisture proof and a good insulator. Irvington Black Finishing Varnish—a spirit varnish for finishing coats on motors, etc.

Place that requisition today.

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Irvington, New Jersey.

Established 1905

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E. M. Walcott, Rochester
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Consumers Rubber Co., Cleveland
Clapp & Lamoree, Los Angeles
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  - Consolidated Car Heating Co.
  - Economy Elec. Devices Co.
  - Gold Car Heating & Lighting Co.
  - Nat'l Ry. Appliance Co.
  - Smith Heater Co., Peter
- **Heaters, Car, Hot Air and Water**
  - Electric Service Sup. Co.
  - Smith Heater Co., Peter
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  - Indianapolis Switch & Frog Co.
  - Railway Track-work Co.
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  - Ford Chain-Block Co.
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  - Ingersoll-Rand Co.
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  - Ohio Brass Co.
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  - Allis-Chalmers Mfg. Co.
- **Indicating, Signals**
  - Nichols-Lintern Co.
  - Oskel Equipment Co.
- **Inspecting Engineers and Chemists**
  - Pittsburgh Testing Laboratory
- **Instruments, Measuring, Testing and Recording**
  - Economy Elec. Devices Co.
  - Electric Service Sup. Co.
  - General Electric Co.
  - Westinghouse Elec. & M. Co.
- **Insulating Cloth, Paper and Tape**
  - Anchor Webbing Co.
  - General Electric Co.
  - Hope Webbing Co.
  - Irvington Varnish & Ins. Co.
  - Okonite Co.
  - Standard Underground Cable Co.
  - Westinghouse E. & M. Co.
- **Insulating Machinery**
  - Amer. Ins. Machinery Co.
- **Insulating Silk**
  - Irvington Varnish & Ins. Co.
- **Insulation (See also Paints)**
  - Anderson M. Co., A. & J. M.
  - Electric Ry. Equipment Co.
  - Electric Service Sup. Co.
  - General Electric Co.
  - Irvington Varnish & Ins. Co.
  - Okonite Co.
  - Westinghouse Elec. & M. Co.
- **Insulators (See also Line Material)**
  - Anderson M. Co., A. & J. M.
  - Electric Ry. Equipment Co.
  - Electric Service Sup. Co.
  - Irvington Varnish & Ins. Co.
  - Ohio Brass Co.
  - Westinghouse Elec. & M. Co.
- **Insulator Pins**
  - Electric Service Sup. Co.
  - Hubbard & Co.
- **Insulators, High Voltage**
  - Lapp Insulator Co., Inc.
- **Insulation, Slot**
  - Irvington Varnish & Ins. Co.
- **Insulating Varnishes**
  - Irvington Varnish & Ins. Co.
- **Insurance, Fire**
  - Marsh & McLennan
- **Insurance**
  - Travellers Insurance Co.
- **Jacks (See also Hoists and Lifts)**
  - Buckeye Jack Mfg. Co.
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
  - National Ry. Appliance Co.
- **Journal Boxes**
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
- **Junction Boxes**
  - Standard Underground Cable Co.
- **Lamp Guards and Fixtures**
  - Anderson M. Co., A. & J. M.
  - Electric Service Sup. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Lamps, Arc and Incandescent (See also Headlights)**
  - Anderson M. Co., A. & J. M.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Lamps, Signal and Marker**
  - Nichols-Lintern Co.
- **Lanterns, Classification**
  - Nichols-Lintern Co.
- **Leather Cloth**
  - Stanadrd Textile Products Co.
- **Lightning Arresters**
  - Shaw, Henry M
- **Lightning Protection**
  - Anderson M. Co., A. & J. M.
  - Electric Service Sup. Co.
  - General Electric Co.
  - Ohio Brass Co.
  - Westinghouse Elec. & M. Co
- **Line Material (See also Brackets, Insulators, Wires, Etc.)**
  - Anderson M. Co., A. & J. M.
  - Archbold-Brady Co.
  - Columbia M. W. & M. I. Co.
  - Electric Ry. Equipment Co.
  - Electric Service Sup. Co.
  - English Electric Co.
  - General Electric Co.
  - Hubbard & Co.
  - Westinghouse Elec. & M. Co.
- **Locking Spring Boxes**
  - Wharton, Jr. & Co., Inc., Wm.
- **Locomotives, Electric**
  - Baldwin Locomotive Wks.
  - General Electric Co.
  - Westinghouse Elec. & M. Co.
- **Lubricating Engineers**
  - Galena-Signal Oil Co.
  - Texas Co.
  - Universal Lubricating Co.
- **Lubricants, Oil and Grease**
  - Galena Signal Oil Co.
  - Texas Co.
  - Universal Lubricating Co.
- **Lumber (See Poles, Ties, etc.)**
- **Machine Tools**
  - Columbia M. W. & M. I. Co.
- **Manganese Parts**
  - Bemis Car Truck Co.
- **Manganese Steel Guard Rails**
  - Ramapo Ajax Corp.
- **Manganese Steel, Special Track Work**
  - Indianapolis Switch & Frog Co.
  - Wharton, Jr., & Co., Inc., Wm.
- **Manganese Steel Switches, Frogs and Crossings**
  - Ramapo Ajax Corp.
- **Meters, Car Watt-Hour**
  - Economy Elec. Devices Co.
- **Motor Buses (See Buses, Motor)**
- **Motormen's Seats**
  - Brill Co., The J. G.
  - Electric Service Sup. Co.
  - St. Louis Car Co.
  - Wood Co., Chas. N.
- **Motors, Electric**
  - Allis-Chalmers Mfg. Co
  - General Electric Co.
  - Westinghouse Elec. & M. Co
- **Motor and Generator Sets**
  - General Electric Co.
- **Nuts and Bolts**
  - Allis-Chalmers Mfg. Co.
  - Barbour-Stockwell Co.
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
  - Hubbard & Co.
- **Oils (See Lubricants)**
- **Oxygen**
  - International Oxygen Co.
- **Packing**
  - Electric Service Sup. Co.
  - Westinghouse Tr. Br. Co.
- **Paints and Varnishes, Preservative**
  - Beckwith-Chandler Co.
  - Dixon Crucible Co., Joseph
- **Paints and Varnishes for Woodwork**
  - Beckwith-Chandler Co.
  - National Ry. Appliance Co.
- **Pavement Breakers**
  - Ingersoll-Rand Co
- **Paving Guards, Steel**
  - Godwin Co., Inc., W. S.
- **Paving Material**
  - Amer. Br. Shoe & Fdry. Co.
- **Pickups, Trolley Wire**
  - Electric Service Sup. Co.
  - Ohio Brass Co.
- **Pinion Pullers**
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
  - General Electric Co.
  - Wood Co., Chas. N.
- **Pinions (See Gears)**
- **Pins, Case Hardened, Wood and Iron**
  - Bemis Car Truck Co.
  - Electric Service Sup. Co.
  - Ohio Brass Co.
  - Westinghouse Tr. Br. Co.
- **Pipe**
  - National Tube Co
- **Pipe Fittings**
  - Westinghouse Tr. Br. Co.
- **Planers (See Machine Tools)**
- **Plates for Tee Rail Switches**
  - Ramapo Ajax Corp.
- **Pliers, Rubber Insulated**
  - Electric Service Sup. Co
- **Pneumatic Tools and Accessories**
  - Ingersoll-Rand Co.
- **Pole Line Hardware**
  - Ohio Brass Co.
- **Pole Reinforcing**
  - Drew Elec. & Mfg. Co
  - Hubbard & Co.
- **Poles, Metal Street**
  - Bates Expanded Steel Truss Co.
  - Electric Ry. Equip. Co.
  - Hubbard & Co.
- **Poles and Ties, Treated**
  - Bell Lumber Co.
  - International Creosoting & Construction Co.
- **Poles, Ties, Posts, Piling and Lumber**
  - Baker Wood Preserving Co.
  - Bell Lumber Co.
  - International Creosoting & Construction Co.
- **Poles, Trolley**
  - Anderson M. Co., A. & J. M.
  - Bayonet Trolley Harp Co.
  - Columbia M. W. & M. I. Co.
  - National Tube Co
  - Nuttall Co., R. D.
- **Poles, Tubular Steel**
  - Elec. Ry. Equip. Co.
  - Electric Service Sup. Co.
  - National Tube Co
- **Porcelain, Special High Voltage**
  - Lapp Insulator Co.
- **Potheads**
  - Okonite Co.
- **Power Saving Devices**
  - Economy Elec. Devices Co.
  - Nat'l Ry. Appliance Co.
- **Pressure Regulators**
  - General Electric Co.
  - Westinghouse Elec. & M. Co.
- **Pumps**
  - Allis-Chalmers Mfg. Co
  - Ingersoll-Rand Co.
- **Pumps, Vacuum**
  - Ingersoll-Rand Co.
- **Punches, Ticket**
  - Bonney-Vehslage Tool Co.
  - International Register Co., The
  - Wood Co., Chas. N.
- **Rail Braces and Fastenings**
  - Ramapo Ajax Corp.
- **Rail Joints**
  - Carnegie Steel Co
- **Rail Joints, Welded**
  - Indianapolis Switch & Frog Co.
- **Rail Grinders (See Grinders)**
- **Railway Paving Guards Steel**
  - Godwin Co., Inc., W. S.
- **Railway Safety Switches**
  - Consolidated Car Heating Co.
  - Westinghouse Elec. & M. Co
- **Railway Welding (See Welding Processes)**
- **Rattan**
  - Brill Co., The J. G.
  - Electric Service Sup. Co
  - Hale-Kilburn Co.
  - Heywood-Wakefield Co.
  - St. Louis Car Co
- **Registers and Fittings**
  - Brill Co., The J. G.
  - Electric Service Sup. Co.
  - International Reg. Co., The
  - Ohmer Fare Register Co.
  - Rooke Automatic Reg. Co.
- **Reinforcement, Concrete**
  - Amer. Steel & Wire Co.
  - Carnegie Steel Co.
- **Repair Shop Appliances (See also Coil Banding and Winding Machines)**
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co
- **Repair Work (See also Coils)**
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - Westinghouse Elec. & M. Co.
- **Replacers, Car**
  - Columbia M. W. & M. I Co.
  - Electric Service Sup. Co.
- **Resistance, Grid**
  - Columbia M. W. & M. I. Co
- **Resistance, Wire and Tube**
  - General Electric Co.
  - Westinghouse Elec. & M. Co.
- **Resistances**
  - Consolidated Car Heating Co.
- **Retrievers, Trolley (See Catchers and Retrievers, Trolley)**
- **Rheostats**
  - General Electric Co
  - Westinghouse Elec. & M. Co.
- **Sanders, Track**
  - Brill Co., The J. G
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co
  - Nichols-Lintern Co
  - Ohio Brass Co.
- **Sash Fixtures, Car**
  - Brill Co., The J. G.
- **Sash, Metal, Car Window**
  - Hale-Kilburn Co
- **Scrapers, Track (See Cleaners and Scrapers, Track)**
- **Screw Drivers, Rubber Insulated**
  - Electric Service Sup. Co
- **Seating Materials**
  - Brill Co., The J. G
  - Stanadrd Textile Products Co.
- **Seats, Bus**
  - Hale-Kilburn Co
  - Heywood-Wakefield Co.
  - St. Louis Car Co.
- **Seats, Car (See also Rattan)**
  - Brill Co., The J. G.
  - Hale & Kilburn Corp.
  - Heywood-Wakefield Corp
  - St. Louis Car Co
- **Second-Hand Equipment**
  - Electric Equipment Co.
  - Michaels Hymen Co
  - Levis, Henry Co.
  - Toledo-Indiana R.R. Co
  - Transit Equipment Co
- **Shades, Vestibule**
  - Brill Co., The J. G
- **Shovels**
  - Hubbard & Co
- **Shovels, Power**
  - Allis-Chalmers Mfg. Co.
  - Brill Co., The J. G.
- **Signals, Car Starting**
  - Consolidated Car Heating Co
  - Electric Service Sup. Co.
  - Nat'l Pneumatic Co., Inc.
- **Signals, Indicating**
  - Nichols-Lintern Co
  - Oskel Equipment Co
- **Signal Systems, Block**
  - Electric Service Sup. Co.
  - Nachod Signal Co., Inc.
  - Union Switch & Signal Co
  - U. S. Electric Signal Co.
  - Wood Co., Chas. N.
- **Signal Systems, Highway Crossing**
  - Nachod Signal Co., Inc.
  - U. S. Electric Signal Co.
- **Slack Adjusters (See Brake Adjusters)**
- **Slag**
  - Carnegie Steel Co.
- **Sleet Wheels and Cutters**
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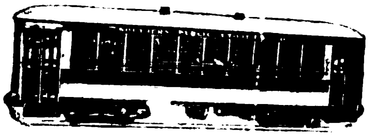

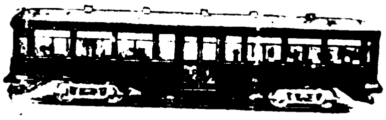

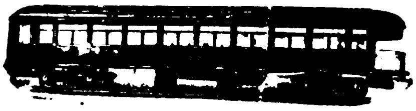

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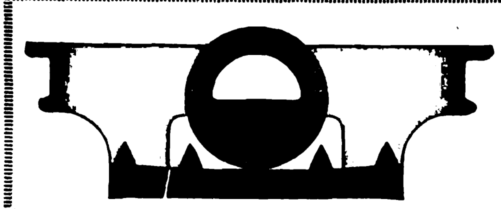

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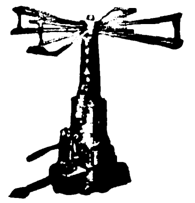

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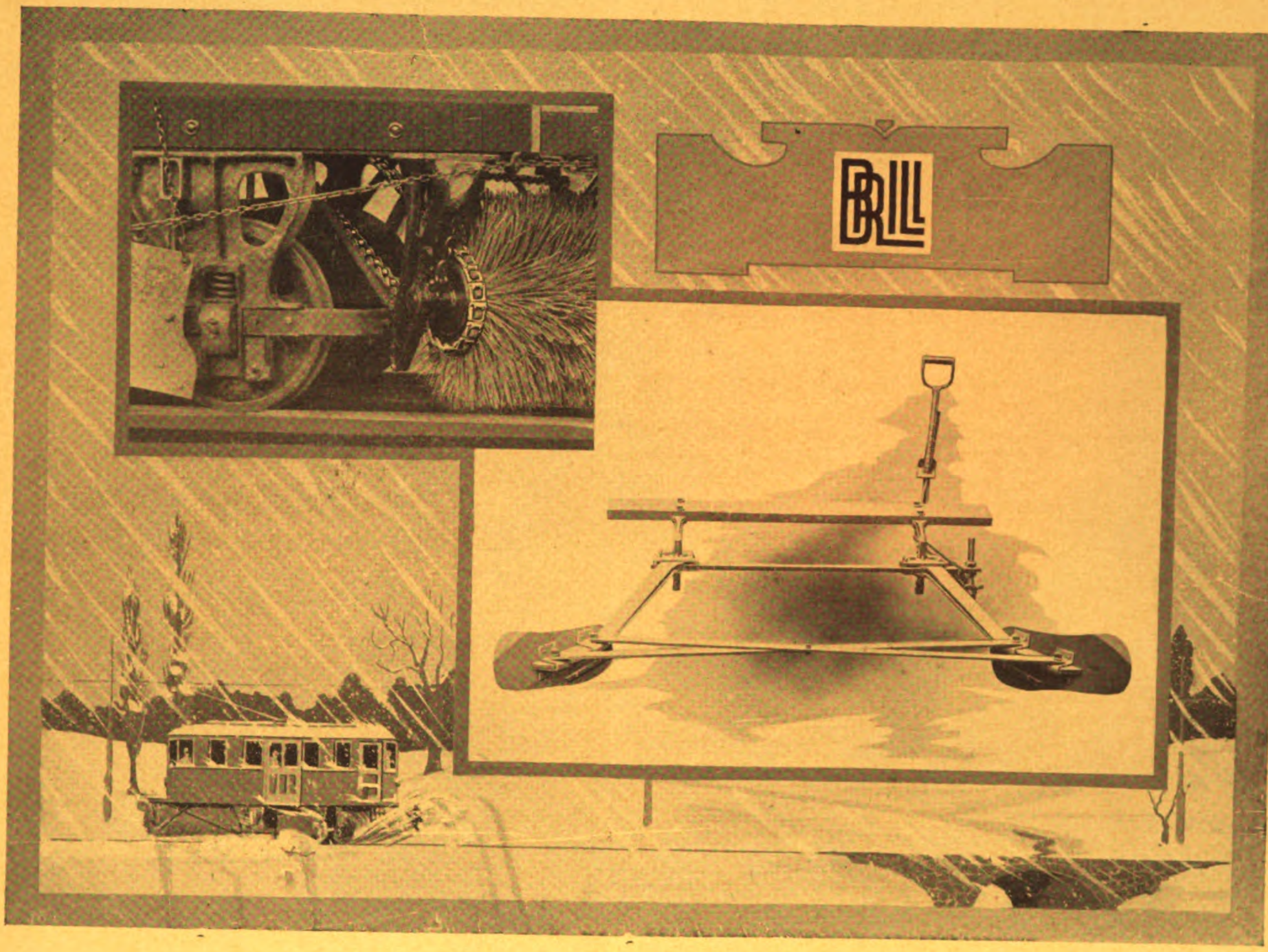

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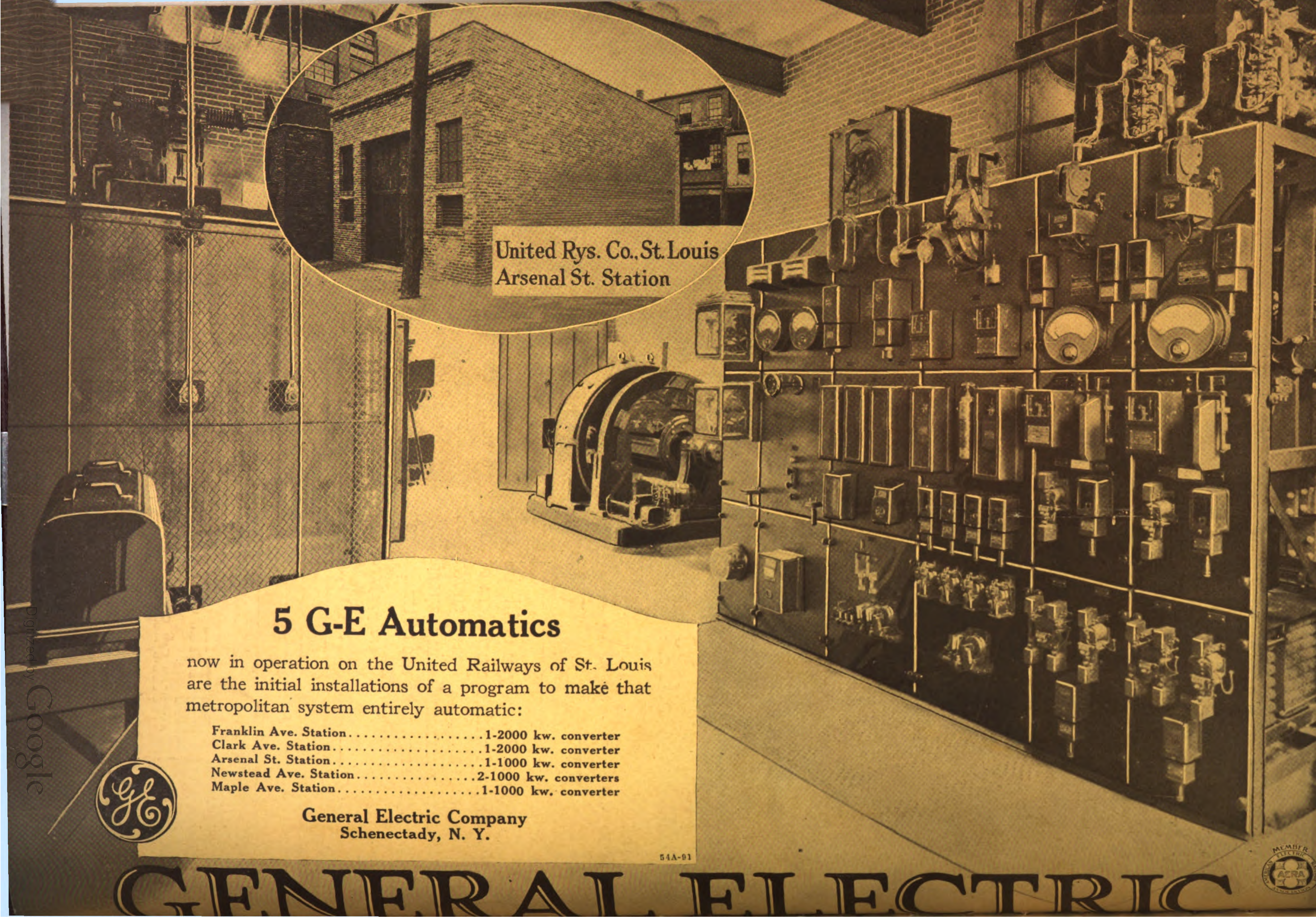

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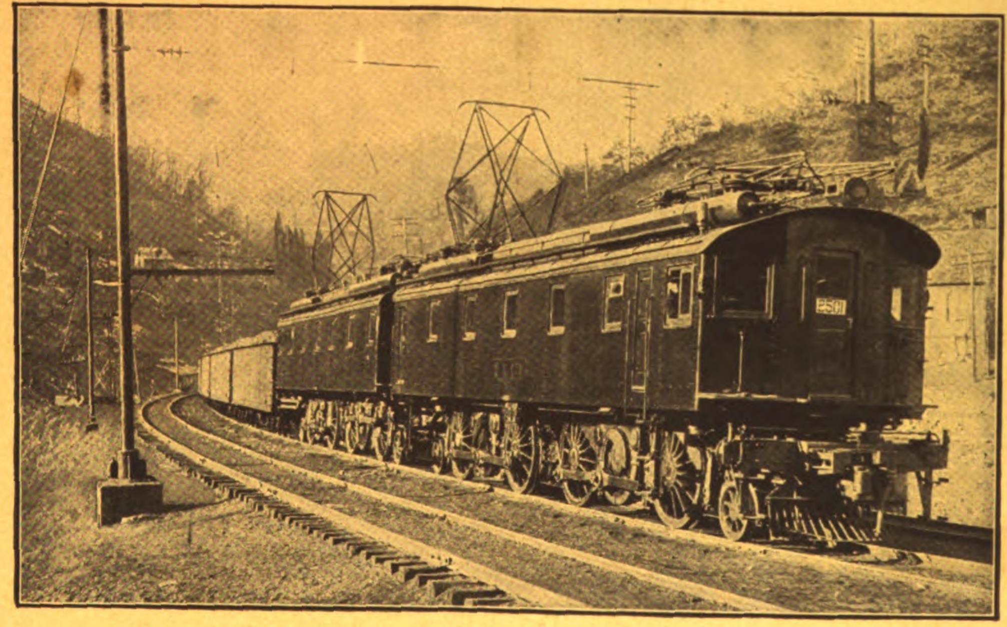

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Editorial and Business Offices

We're back on the twelfth floor where we greeted you before starting our trip through the House of McGraw-Hill. The deserted appearance is explained by the clock—it is now the noon hour. The room is flooded with light from great north windows 11 ft. wide and 18 ft. tall. The west wall is lined 9 ft. deep with books. Above the east and south sides of the room you see the attractive mezzanine floor on which are located the telephone, telegraph and other important departments as well as the spacious offices of the principal executives.

While three sides of the lower floor, next to the windows, contain the editorial and business offices of seven publications, most of the glass-inclosed offices you see at the right are used by Electric Railway Journal. Our make-up editor and his assistant, to whose expert work every issue of the Journal bears witness, occupy the northeast corner of the floor, next to a cathedral-tall window. Associate editors, assistant business managers, secretaries and clerks work in the "great open spaces."

To get the best view of the floor you must see it from above. From the "mezz" you see there is plenty of space between filing cases and desks and that the 125 men and women at work on seven publications have plenty of room. There is ceaseless activity on this floor and each day sees a tremendous volume of work turned out, but all is done so noiselessly that visitors invariably comment on the silence and restfulness of these editorial and business offices.

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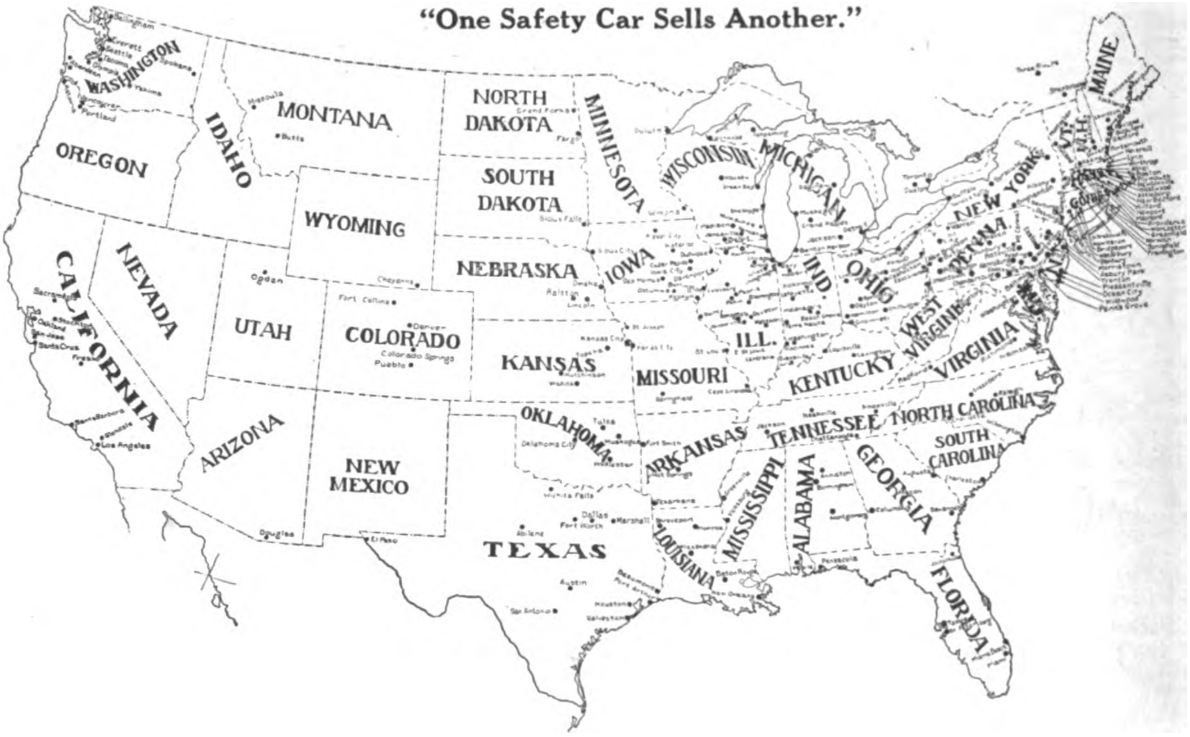

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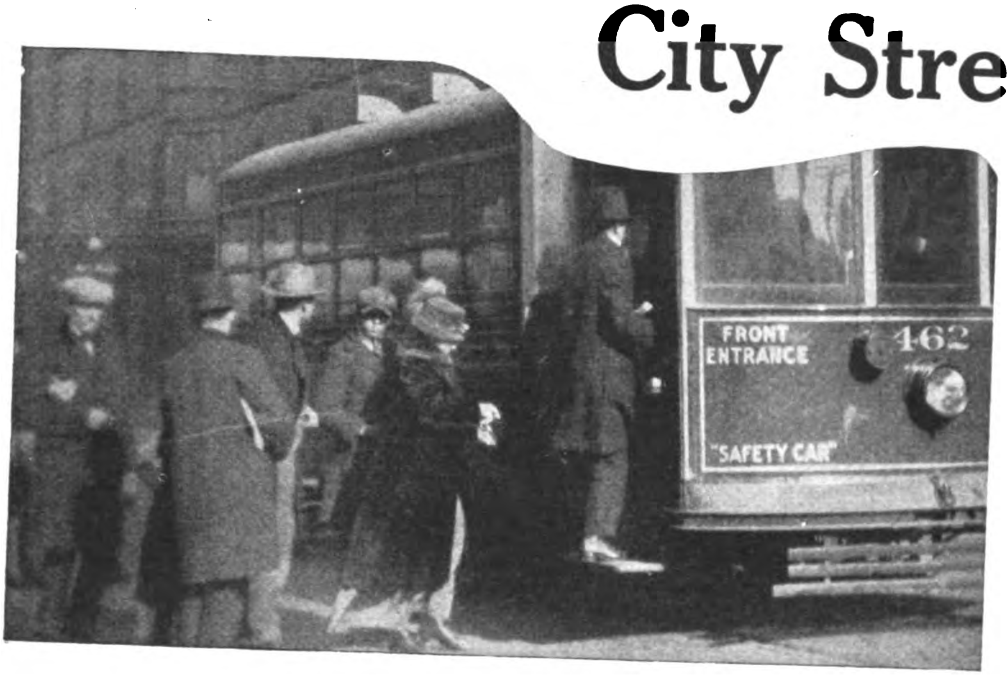

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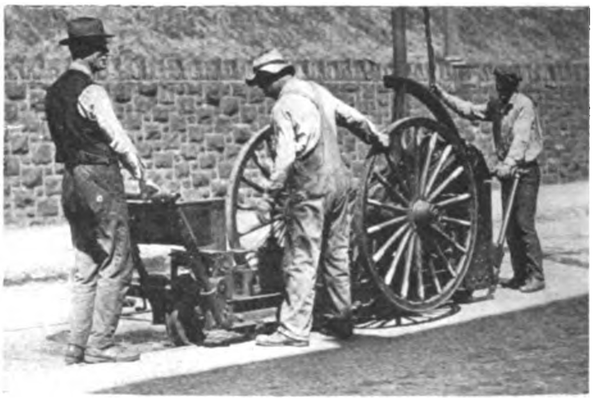
—*Charles A. Coffin Medal*



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This equipment helps to keep track "fast, safe and smooth and comfortable" on the principal electric railway systems of the world.

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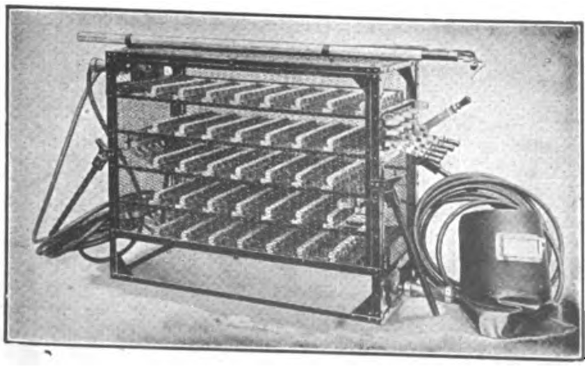

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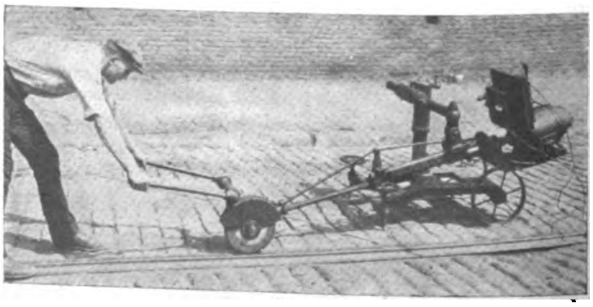
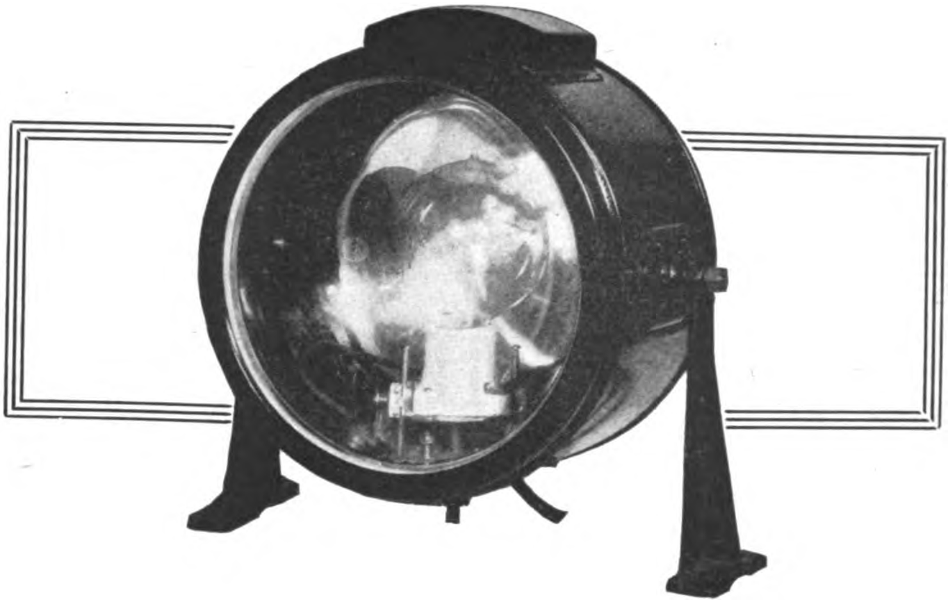
"Atlas" Rail Grinder



"Hercules" Rail Grinder



Roof Mounting Imperials

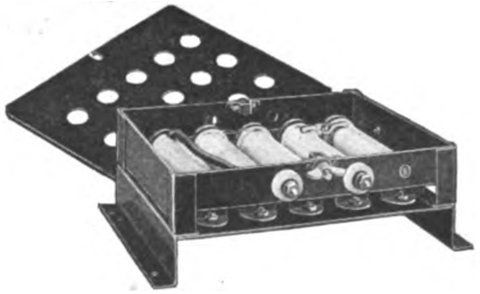
There are quite a number of railways that have standardized on Imperial Roof Mounting Incandescents. Several of the Imperial case designs with incandescent elements are listed for mounting on the roof of the car.

Operators on these properties tell us that the illumination from a headlight on the roof gives more general satisfaction—that the motormen like it better. In addition damage to the headlight from collision or other accidents is minimized. They have backed their belief by standardizing on Roof Mounting Imperials.

The headlight shown above is from the DC Series with 11 inch reflector for interurbans. The other popular Crouse-Hinds Incandescent types for both city and interurban service carry listings for roof mounting.

Imperial Incandescent specifications cover reflectors from 7¼ to 16 inches; sheet steel and cast iron cases; flush, surface and roof mounting; plain clear glass in plain or grid doors and clear or colored semaphore lenses in plain or guarded doors. Reflectors are gold, crystal and sterling ray, also polished aluminum, nickel plated copper or white enameled steel.

Imperial Headlights are made for city or interurban service with luminous arc, carbon arc or incandescent elements.



The improved Form C Removable-unit resistances are made with porcelain tubes wound with moisture and temperature proof alloy wire.

Imperial Headlights are made by the Crouse-Hinds Company and sold exclusively by The Ohio Brass Co.

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Aluminum is resistant to corrosion, easy to handle and install—and it saves two-thirds the weight.

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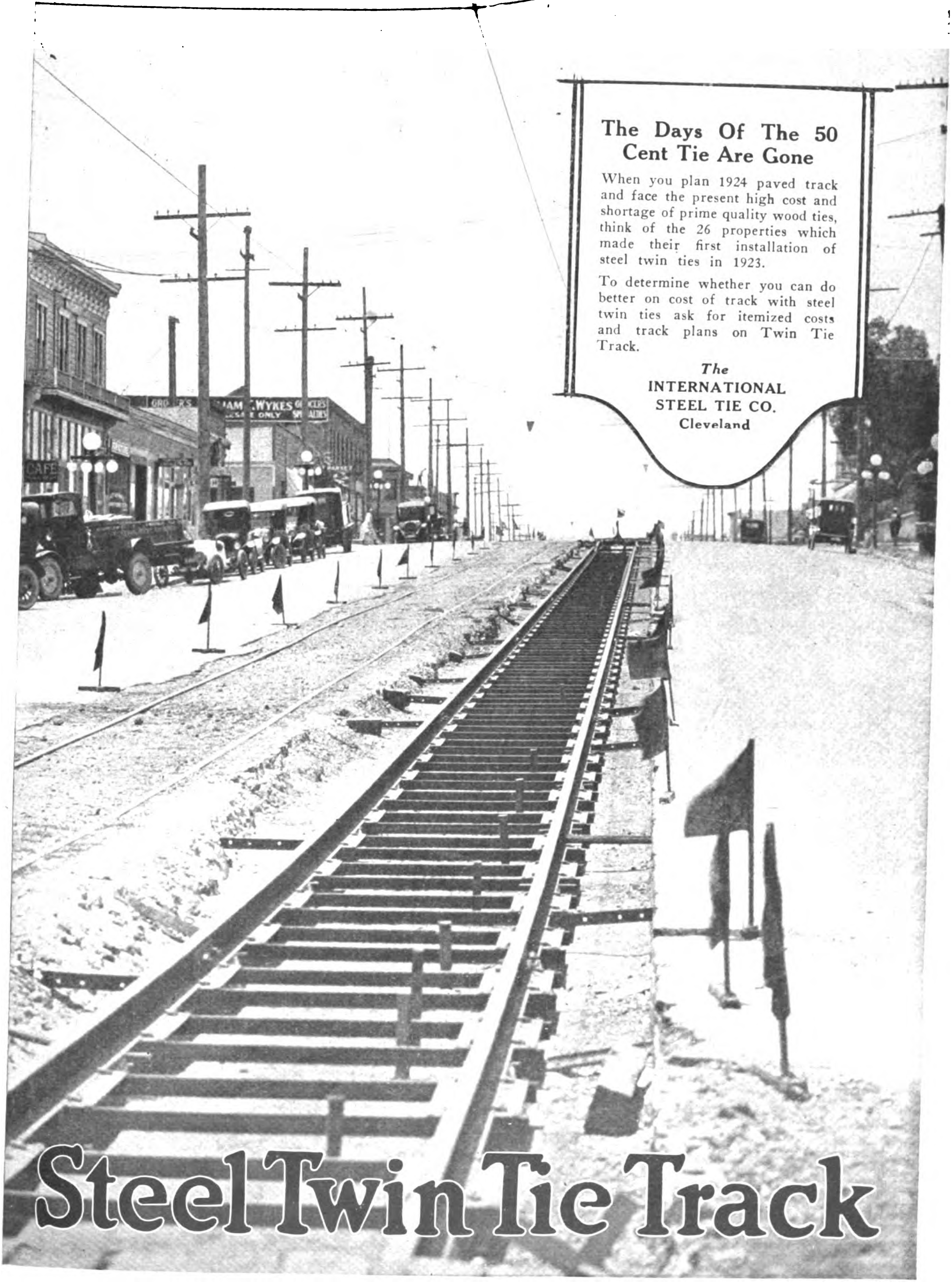

The Days Of The 50 Cent Tie Are Gone

When you plan 1924 paved track and face the present high cost and shortage of prime quality wood ties, think of the 26 properties which made their first installation of steel twin ties in 1923.

To determine whether you can do better on cost of track with steel twin ties ask for itemized costs and track plans on Twin Tie Track.

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Cleveland

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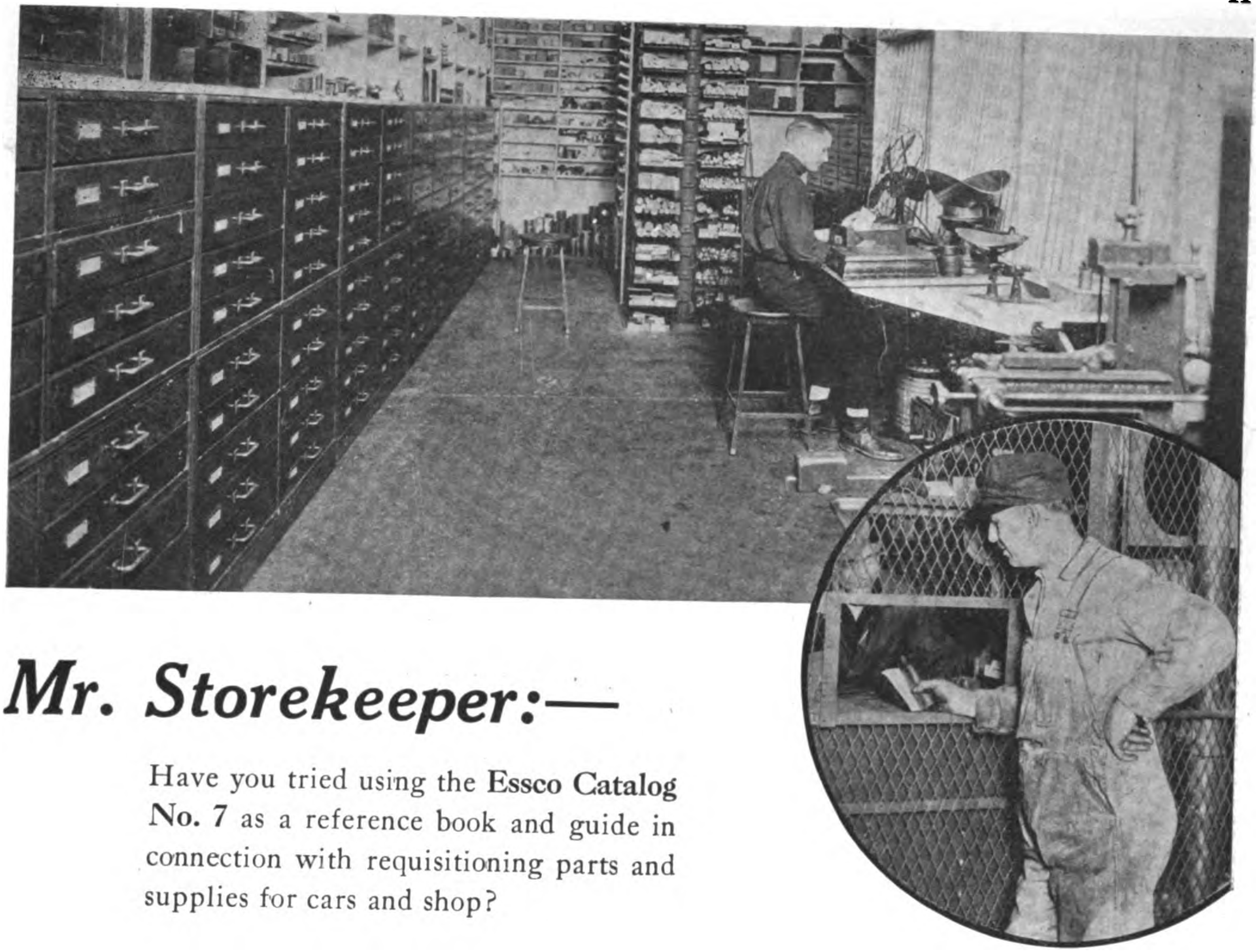

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Have you tried using the **Essco Catalog No. 7** as a reference book and guide in connection with requisitioning parts and supplies for cars and shop?

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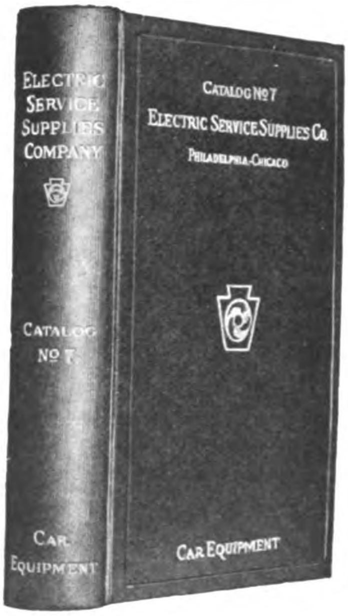
A 688-page book, well-bound, profusely illustrated and indexed with big, clear cuts and diagrams, dimensions given, data furnished and list prices quoted on the widest variety of electric car equipment. Its usefulness to you is about unlimited. Try it.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Catalog No 7
Car Equipment
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Car Equipment

ELECTRIC SERVICE SUPPLIES Co.

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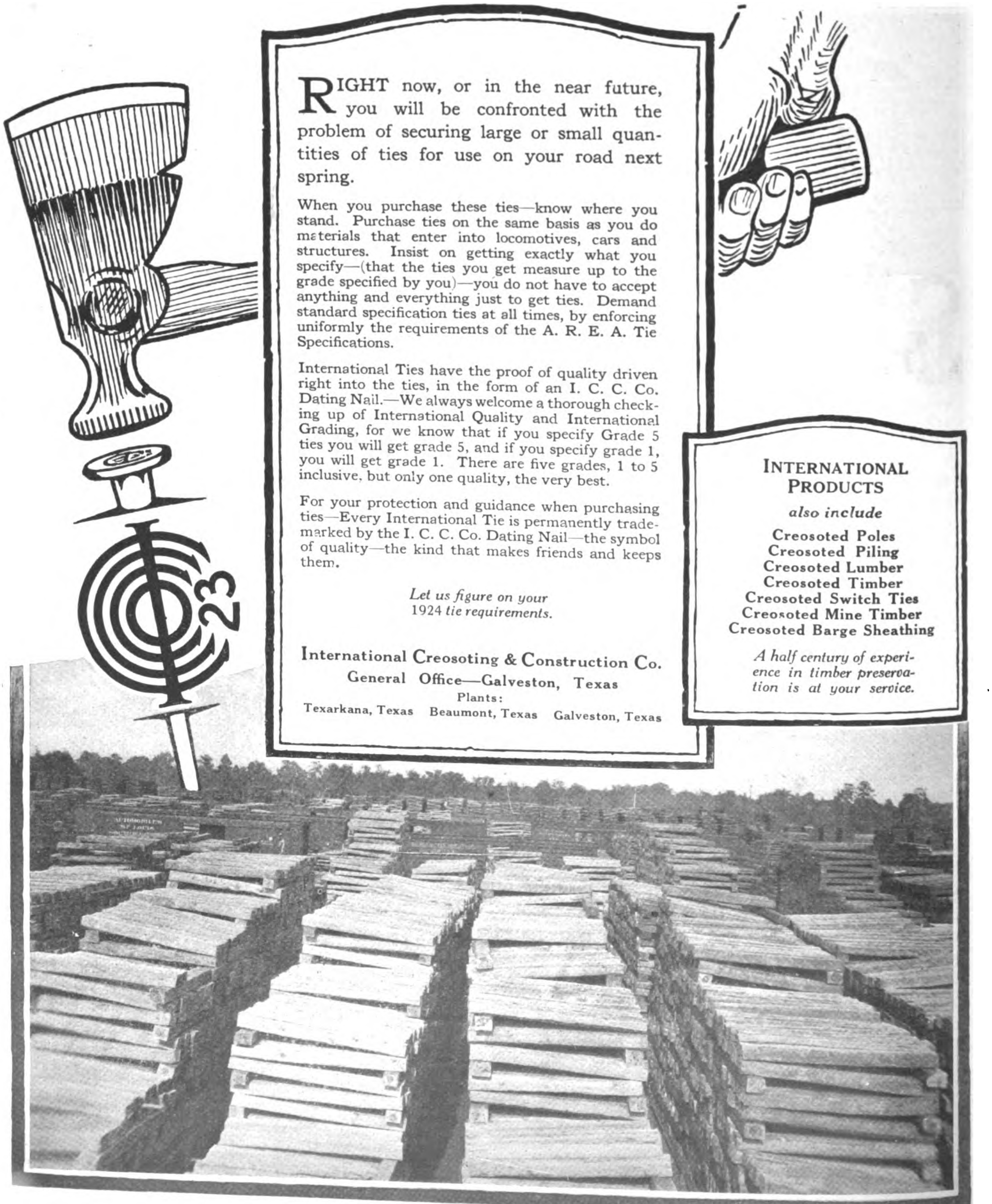
Ernest Demoly, Paris, France. Electro-Traccion, Madrid, Spain.

Driving Home the Proof of Tie Quality



RIGHT now, or in the near future, you will be confronted with the problem of securing large or small quantities of ties for use on your road next spring.

When you purchase these ties—know where you stand. Purchase ties on the same basis as you do materials that enter into locomotives, cars and structures. Insist on getting exactly what you specify—(that the ties you get measure up to the grade specified by you)—you do not have to accept anything and everything just to get ties. Demand standard specification ties at all times, by enforcing uniformly the requirements of the A. R. E. A. Tie Specifications.

International Ties have the proof of quality driven right into the ties, in the form of an I. C. C. Co. Dating Nail.—We always welcome a thorough checking up of International Quality and International Grading, for we know that if you specify Grade 5 ties you will get grade 5, and if you specify grade 1, you will get grade 1. There are five grades, 1 to 5 inclusive, but only one quality, the very best.

For your protection and guidance when purchasing ties—Every International Tie is permanently trademarked by the I. C. C. Co. Dating Nail—the symbol of quality—the kind that makes friends and keeps them.

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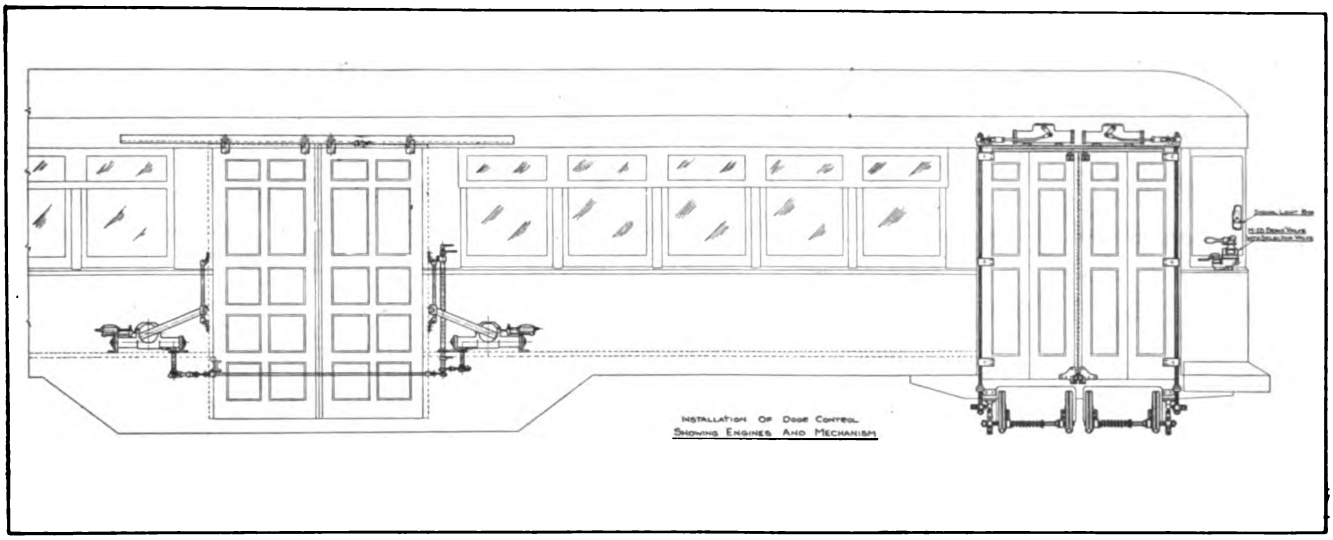

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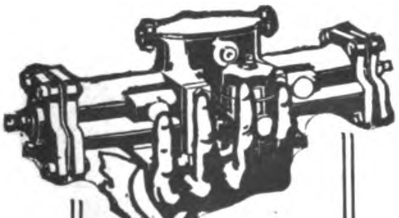
Mr. Electric Railway Man—

DO you realize that National Pneumatic equipment is easy to install, not only on new cars, but on the old ones that you want to rehabilitate?

Do you realize that the maintenance required by National Pneumatic equipment is almost too trivial to talk about? The rugged simplicity of its design and construction eliminate operating troubles.

Do you realize that the use of National Pneumatic Equipment simplifies problems of speed and safety when one man operation of larger units is contemplated?

A little investigation will convince you



Door Engines

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Operating Mechanisms

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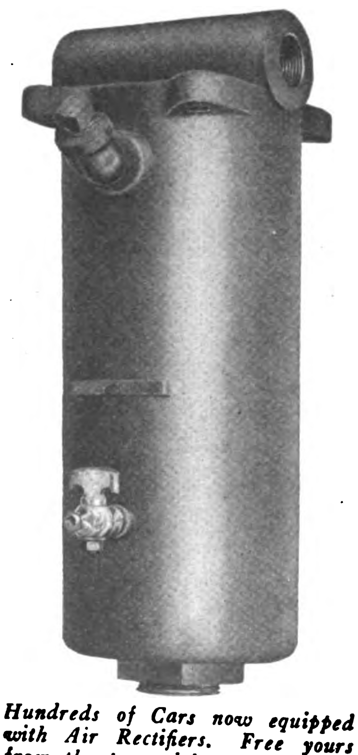
The Air Rectifier Eliminates Frozen Air



Hundreds of Cars now equipped with Air Rectifiers. Free yours from the perennial trouble due to frozen air. It will pay to investigate and order trial sets for the coming winter.

An Air Rectifier is a simple, inexpensive device, easily installed. It has no moving parts, operates automatically, and fully protects car air equipment against "frozen air." When the atmospheric temperature approaches the freezing point such troubles develop. The expansion of air into the cold piping condenses out the moisture which freezes, thus building up a honeycomb formation in the pipes and finally rendering the brake system inoperative.

An Air Rectifier, without in any way obstructing the air passage, automatically mixes alcohol and its vapor with the water and air. This lowers the freezing point and enables the normal flow of air to expel the water from the system.

An Air Rectifier holds three pints of alcohol—an amount sufficient for ordinary service for 90 days operation. Moreover it will improve braking service by cutting the grease, oil and gum, thereby freeing or easing up the valves.

It serves equally well to prevent "frozen air" troubles on air-operated auxiliary equipment such as door engines, etc.

Send for Complete Description and Prices

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Sangamo Economy Railway Meters (*General Sales Agents*) Lind Aluminum Field Coils
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Woods Fare Boxes
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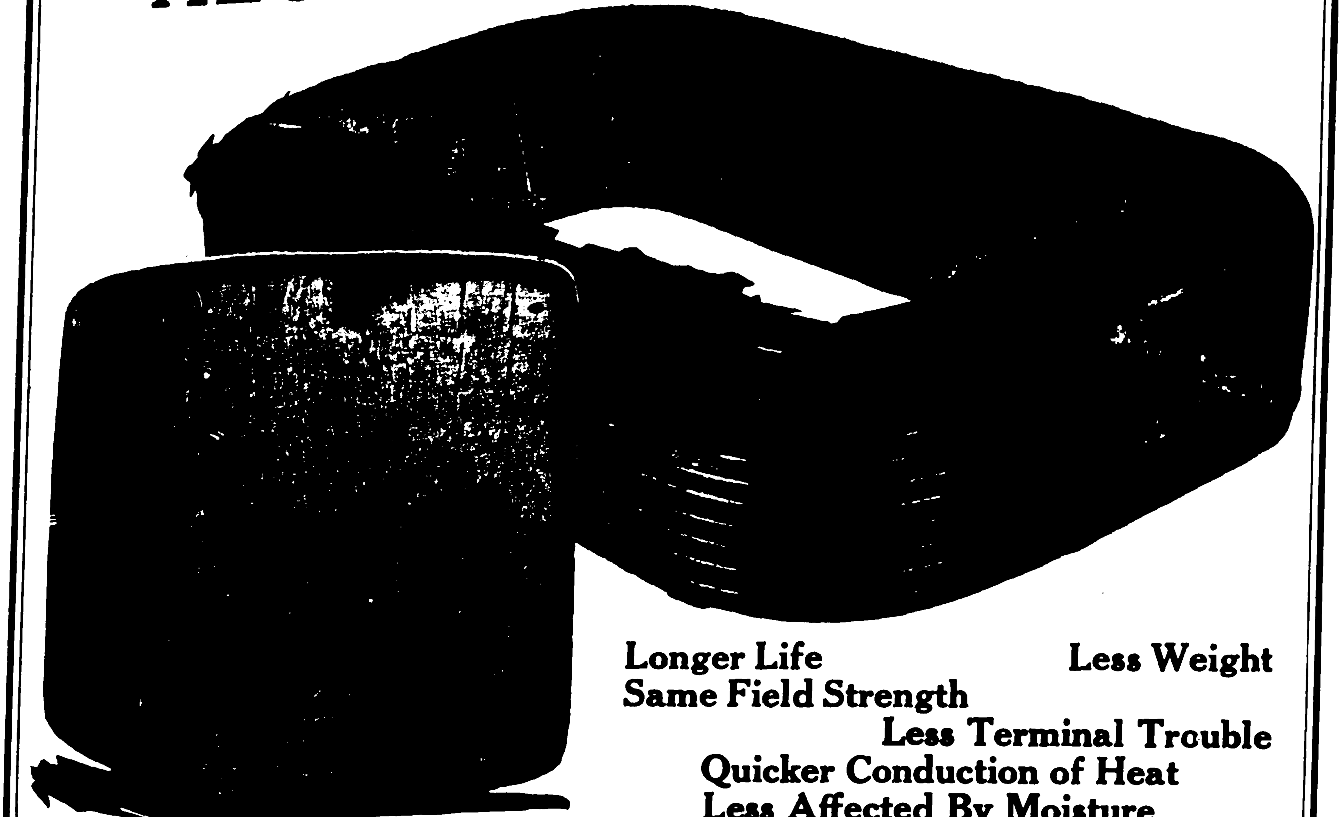
Miller Trolley Shoes
1592 Old Colony Building, Chicago

GOING STRONG
ALUMINUM FIELD COILS



Longer Life **Less Weight**
Same Field Strength
Less Terminal Trouble
Quicker Conduction of Heat
Less Affected By Moisture

The quicker distribution of heat in Aluminum field coils is due to an almost solid metallic path to the exterior via large square wires.

With coils of like resistance the heat generated is identical and aluminum coils are wound to closely duplicate copper coils.

They have the same number of turns and repeated tests show that Lind Aluminum coils develop and maintain full field strength.

The Aluminum oxide insulation is an integral part of the conductor—which means that these coils are less affected by heat and moisture, and since there is no cotton insulation to char or bake out ***shorted fields are practically eliminated.***

The high specific heat of Aluminum compared with copper is another valuable characteristic, especially in coils that are loaded intermittently, as in Railway Service.

Consider these long-life features in addition to that of saving half the weight of all the field coils of every car in many cases a weight reduction of more than 1000 lb.

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L. E. Gould, Pres., Old Colony Bldg., Chicago

National Railway Appliance Co., New York
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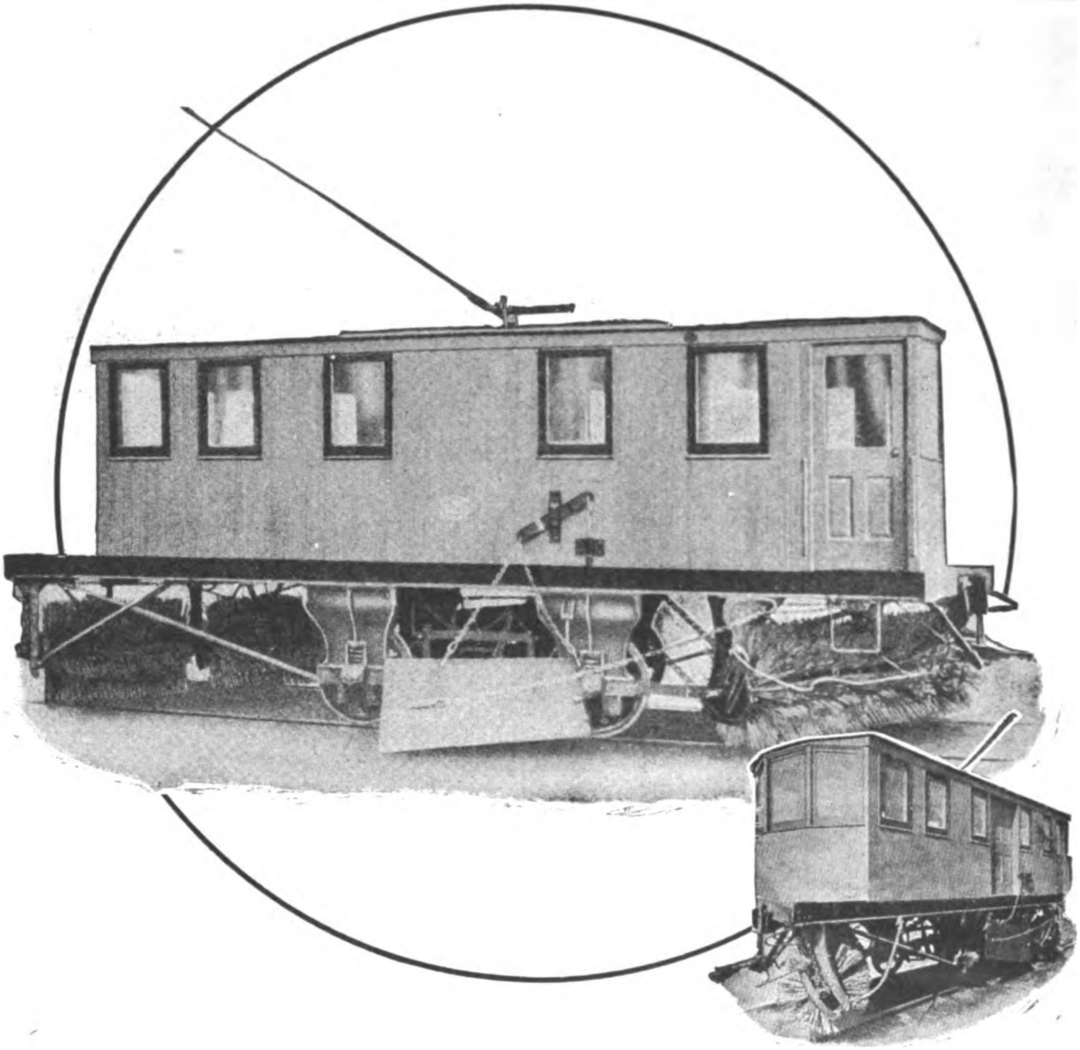
SNOW!—its Removal



Efficient Snow-sweepers and McGuire-Cummings Mfg. Co. are names linked together in the mind of a majority of America's electric railway men. Fully 95% of all electric snow-sweeping equipment used in the United States and Canada is of McGuire-Cummings make.

The Standard single truck, steel underframe, long broom sweeper shown above is exceptionally strong and rigidly built, handling deep snow rapidly without stalling. The long broom clears both rails and fifteen inches additional on the outside of each track. Each broom is equipped with case-hardened roller bar steel belt chain, with detachable links.

Over 1,400 of these long-broom sweepers are in use in all parts of the world where they have snow to contend with. Sweepers are also built in other types to cover every snow-fighting problem.

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General Offices
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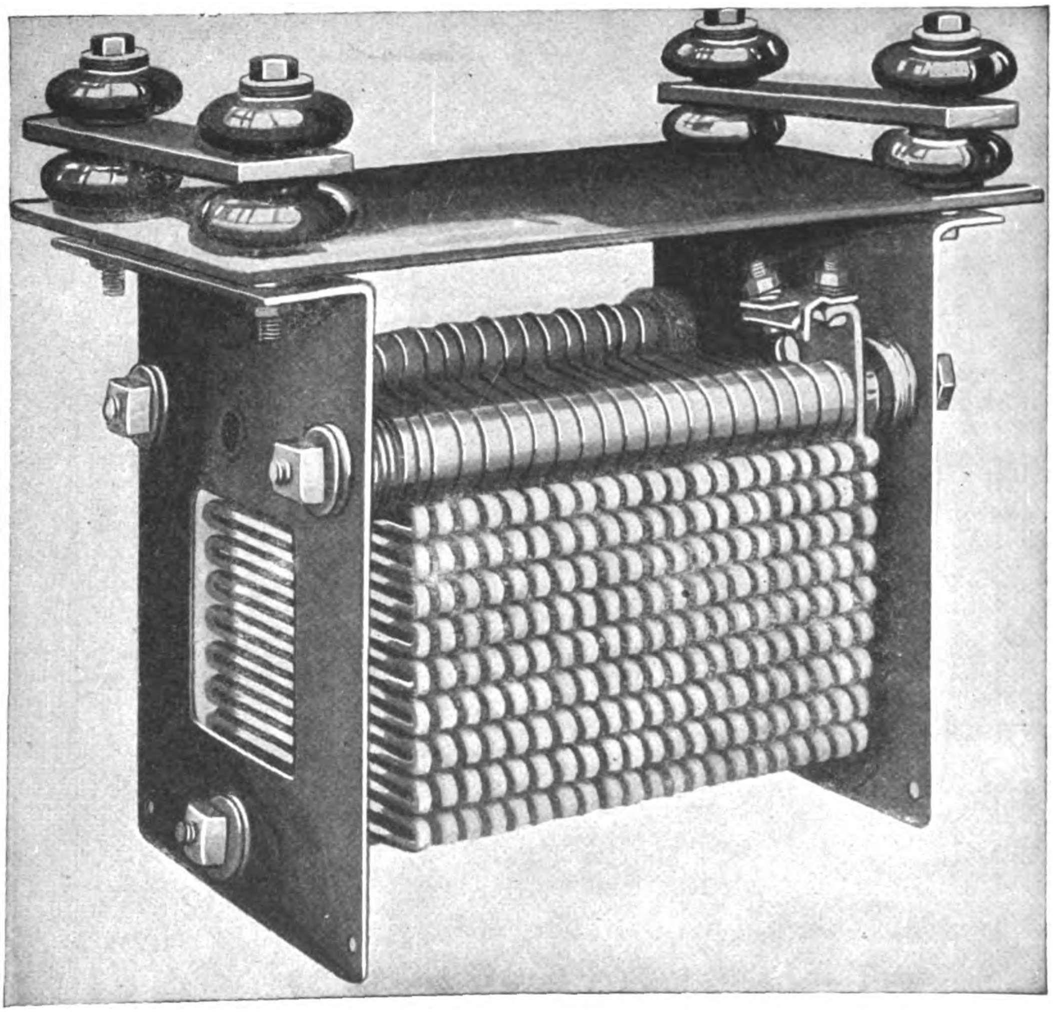
Another step in Standardization



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An improved Resistor without new repair parts

This new BG Resistor combines the advantages of the well-known CG type and the rigid grid construction of the RG type. At the same time it minimizes your stock of resistor parts because it is interchangeable, both electrically and mechanically, with other resistors on the market.

Let our railway engineering specialists explain fully.

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Sales Offices in all Large Cities

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New York, Saturday, November 10, 1923

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

Henry W. Blake and **Harry L. Brown**, *Editors*

Volume 62
Number 19

A Basis for Getting the Merchants to Accept Traffic Regulation

WE ARE all familiar with the phenomenon of a small commercial district springing up almost overnight where only residences used to be. At first thought this may be considered an inevitable accompaniment of the growth of the community. This is partly true, but the neighborhood store is growing at a very much faster rate than the population. Even in cities of moderate size it is now possible to purchase nearly all the necessities of life and most of the luxuries, including high-class entertainment, without going more than a few blocks from one's own home.

The greatest losers by this development are the downtown merchants. But another loser is the electric railway, which is deprived of two fares every time a customer buys at the neighborhood store instead of riding downtown and back. The trolley company and these merchants thus have a common interest in centralized trading.

A contributing reason for this development has been the slowing up of surface transportation systems. The longer it takes to reach the center of the city and return again, the more people get away from the habit of shopping downtown. The modern electric car is faster than its predecessors, but it is being seriously handicapped because of vehicular congestion.

We have been deluged with figures concerning the number of automobiles in this country, totaling some 14,000,000, or about one to every seven inhabitants, and many people have come to believe that the population in its daily comings and goings uses the automobile to the almost entire exclusion of all other means of transportation. This idea has led merchants to make tremendous efforts to attract the automobile trade. But the falsity of this theory can be very easily demonstrated. For example, the recent traffic survey of Los Angeles showed that on one street during a single hour there were more than 14,000 passengers in street cars and only 1,169 riders in automobiles. It is ridiculous to assume that there is more potential purchasing power in 1,100 automobilists than there is in 14,000 trolley riders. The truth is that few merchants could survive on the automobile trade alone. Their prosperity depends upon the proper functioning of the whole transportation system.

This idea is not new to the electric railways, but it is just beginning to be appreciated by the merchants. They have thought that cars parked around their stores meant increased trade. This was true once, but the limit was soon reached. Now only part of those who would shop can find places to park near the store, and the general congestion resulting, added to the other street traffic, tends to close off the easy access to the shops for the multitudes who ride the street cars. And it is in reality these car riders who support the stores, not the automobile owners. Thus, whatever makes it easier and quicker for the street car rider to get to the downtown store is of material interest to the merchant, and if appealed to on this basis, the latter would probably want to support, rather than oppose, as he has often done, the anti-parking and other traffic regulations that would help to speed up street car operation.

Objections to One-Man Cars Are Largely Political in Character

IT IS hard to see the philosophy of demanding the withdrawal of one-man cars, as has been proposed in various cities and states. The most recent cases are those of the state of Massachusetts and the city of Oakland, Cal. The objection to the use of cars of this type seems to come mainly from certain politicians, who use this as a means of keeping an issue before the public in order to line up prospective votes.

The one-man car is not an experiment, and it has been used in so many different localities and under so many different conditions that it has been proved out thoroughly. The annual statistical review published by this paper in the issue for Jan. 6, 1923, showed that approximately 7,500 cars of this type were then in use, and 785 cars were remodeled for one-man service during 1922. A later study made for the annual convention number published Sept. 29, 1923, shows that out of a total of 1,385 cars ordered in the first six months of this year, 1,206, or 87 per cent of the total, were arranged for operation by one man. Surely this does not indicate that the one-man car cannot be depended on for service.

With the use of one-man cars the railways have found it possible to meet rising expenses of operation to some extent and to handle the business at costs not so much above those existing prior to the war, as would be the case without their use. This has kept fares down below what they would have been without such help. The basic fact in this connection that cannot be overlooked is that wages of today are twice as great as they were when the companies were making money on a 5-cent fare, and the account "conducting transportation," which is principally platform labor, amounts to about 50 per cent of the total operating expenses

In Massachusetts, where a bill to abolish one-man cars has been introduced in the Legislature, it has been stated that the electric railways have operated some 56,000,000 car-miles with one-man cars, and that the accident record has been considerably improved as compared with two-man operation. This has been held due largely to the greater responsibility felt and discharged by the individual operator.

In Oakland the San Francisco-Oakland Terminal Railways has made an investment of upward of a million dollars in cars of this type, with the approval of the City Council that now wants to prohibit them. The purchase and the operation of the cars also have the sanction of the State Railroad Commission. The company states that these cars, which were put in service in 1920, have made more than 2,000,000 miles and carried 13,700,000 passengers in safety without protest or complaint. This certainly does not give any valid argument for the present agitation in the City Council.

It is just such actions of politicians as this that lead to many of the financial difficulties of electric railways. It is not an easy matter for the management to do its best to give adequate service under adverse conditions and then have all its labor go for naught at the whim of a group of politicians. Nothing is gained by such moves, as the only persons who may benefit, the car operators, may lose their jobs entirely instead of getting additions to their ranks. As a matter of fact, the best way to make the trainmen prosperous is to make the railway prosperous, and this cannot be done by limiting the productivity of the individual.

Building Traffic—or Driving It Away

HOW MANY of us appreciate the possibility for application of the practice expressed in the much-used words "merchandising transportation"? There is some basis for feeling that the difficulties of many electric railway properties are attributable, in part at least, to a very limited conception of what may be done to sell transportation. Two instances illustrate the point.

The first happened to a man who tried the experiment of traveling from Chicago to Rochester, New York, via electric. He, with several other travelers who cover this territory frequently, were informed by one electric railway property along this route that a connection would be made with another company's car at the terminus of the first line. Coming up the main street of the town, one minute late, the party saw the outgoing car leave the terminal. Apparently no effort was being made by either company to make this very desirable connection.

Compare this example of the way in which this group of regular patrons of the line were accommodated with the details of the second case.

A passenger informed the agent at the station at which he boarded a high-grade limited train of an electric line that he was very anxious to make connection with a through steam railway train at a station some distance from the electric line's terminus in a large city. The agent and then the traffic department quickly responded to the situation. Arrangements were made to hold the steam train for this passenger. The electric train was brought into the terminal several minutes ahead of schedule. A taxicab provided by the electric line was waiting to transport the passenger to the steam road station. Tickets had been secured for him in the meantime by the electric railway traffic department. Needless to say, a delighted passenger boarded the steam train.

The details of the methods used to accomplish this connection are of no particular interest. However, the spirit back of the organization is worthy of imitation.

The two cases cited are extreme, although they are both actual incidents. Imagine the frame of mind toward the electric railways in which these two passengers completed their respective trips and you have a striking example of what it means to merchandise electric railway transportation. If the names of the two railways concerned could be divulged, their respective condition would well illustrate the results of the spirit underlying the incidents related.

Earning Power Is Key to New York Railways Reorganization Plan

TO A reorganization committee, the value of any property lies in its earning power. Capital to build up a property may or may not have been wisely used in that process and may or may not exceed the value of the physical plant, but the net earnings after paying all charges are the usual measure taken of prosperity of an enterprise. It is this consideration probably that has led the committee in charge of the work of preparing a plan for the reorganization of the New York Railways to recommend the wiping out of $17,495,060 of stock of that company, and a change in the remaining financial structure so as to cut fixed charges by $720,000, annual contingent charges by $650,000 and rentals of leased lines by $350,000.

Peculiar circumstances surround the operation of this property. The question of the pursuit of a wise or unwise policy in connection with its operation in the past does not enter into the picture now. With escape from the fixed 5-cent fare apparently impossible, with the competition of the rapid transit lines confronting it and with other factors entering, the entire economic status of the company has changed. All these things the majority representatives of the various security holders have taken into account, and they have submitted for the approval of the court and commission a plan which would appear to make it possible for the company to carry on indefinitely without the likelihood of future disturbance of its credit. Thus the only bonds which it is proposed to leave undisturbed in the reorganization are those which have earned their interest in the past. As the New York *Times* remarked, the lines and leases, the stocks and bonds, which fail to produce dividends or interest are sentenced to capital punishment. To those who are always clamoring for regulation and more regulation, the same paper says that the punishment proposed to be meted out exceeds anything which toothless statutes could inflict. In short, they are economic regulations. The fact that a minority report was presented to the court differing in some of its points from the majority opinion does not alter the main facts, for the ends sought in both reports are essentially the same.

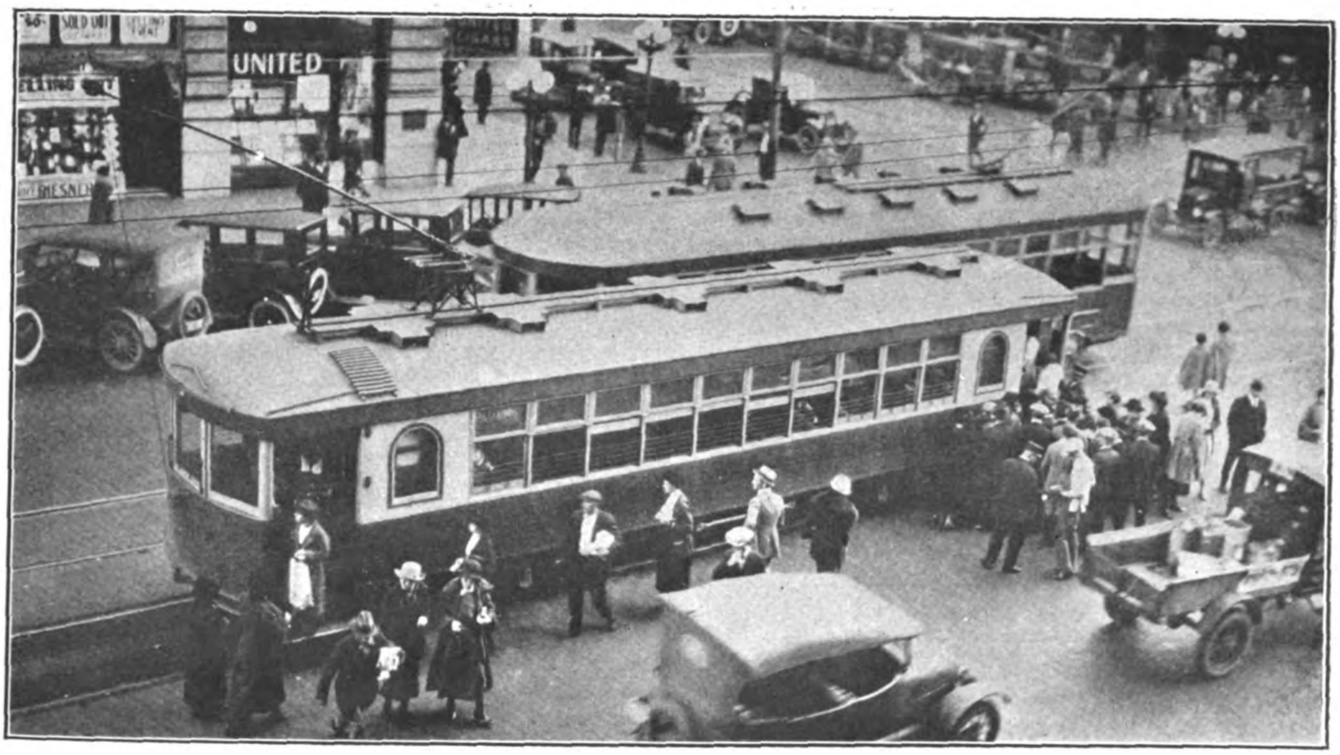
However hard the terms of the reorganization may appear, they could hardly in this instance be less drastic and not invite a repetition of disaster in the future. In this respect they are particularly in the interest of the public, which in the future will be represented on the board of directors under the provision to that end suggested by the committee. This provision is in line with recent thought in New York as shown by the adoption of the same plan by the Interborough Rapid Transit Company and its inclusion in the proposed "consolidation" plan of the Transit Commission.

One Hundred per Cent One-Man Operation Proves Successful in Dayton

Improved Service at a Lower Fare with Double-Truck Cars Has Increased Traffic and Reduced Operating Expenses in Spite of Higher Wages on the City Railway System

By H. C. DeCamp

Formerly Assistant General Manager City Railway, Dayton, Ohio



On One of the Main Streets of Dayton Passengers Are Seen Boarding the One-Man Cars at the Front Door and Leaving at the Rear Door. An Extra Man on the Street at the Front End Is Making Change

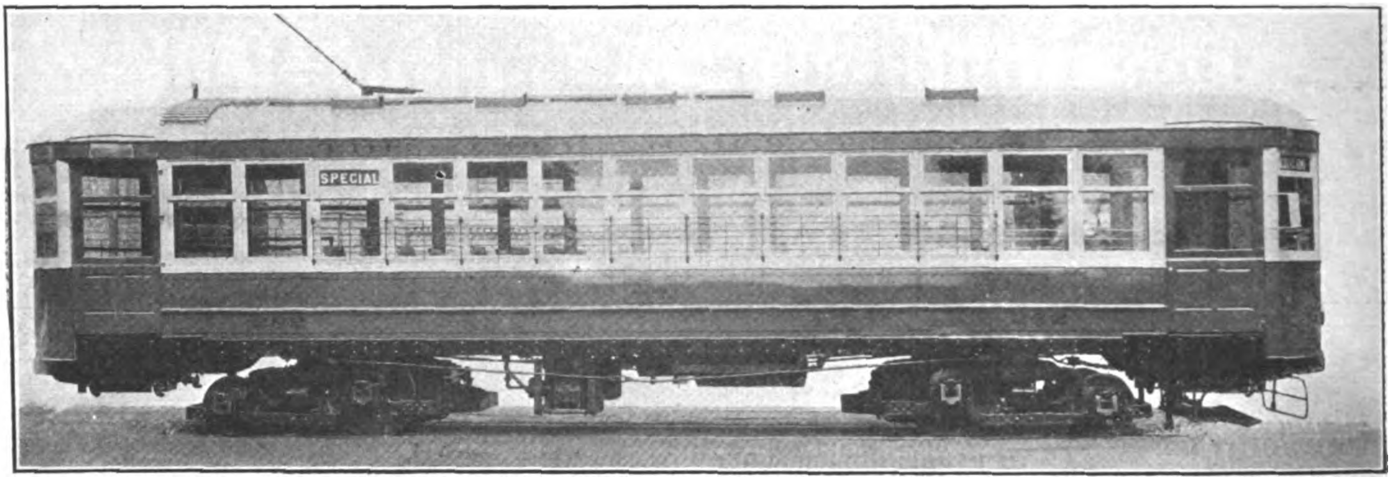
DURING the strike of the platform men of the City Railway in July, 1921, a large number of jitneys made their appearance in Dayton. On this account, after the strike was settled, it was necessary for the company to take vigorous action to regain its lost traffic. Prior to July the fare had been 7 cents or four tickets for a quarter, but it was decided after the strike to reduce the cash fare to 5 cents, with a 1-cent transfer charge.

So much money had been expended during the strike that it was necessary also to cut down the operating expense in order to put the equipment in shape and improve the service. The railway was then operating fifty-six double-truck and several single-truck two-man cars to fill the schedule. Investigation was made in numerous cities where double-truck one-man cars were in use, to determine the feasibility of applying this remedy to the situation in Dayton. This led to the conclusion that if the City Railway could attain 100 per cent one-man operation with double-truck cars the financial problem would be solved.

As a result of the study of one-man operation elsewhere, the company decided to adopt the front-entrance rear-exit plan. There were several reasons for this, the most important being the desire to get the money first, so that in case of any delay on the line, there would be no opportunity for disputes because passengers were not carried through to their destinations. Owing to the layout of the various lines in the city, it was thought that there would be less chance for transfer abuse if transfers were issued when the passengers boarded the cars. Another reason for the adoption of the front-entrance plan was the desire to eliminate boarding accidents which might occur in case the car was crowded and the operator at the front end did not have a clear view of the rear door.

Under the plan being followed in Dayton, after the car has come to a stop, the operator looks into an inside mirror located on the right-hand window post, notes the number of passengers wishing to alight, and when the last one has got off the car, as shown by an outside mirror, he gives a second glance at the inside mirror to note if any other person may suddenly have decided to get off, and if not, closes the rear door and starts the car.

Both front and rear doors are operated by pneu-



Car Built in 1914 and Remodeled for One-Man Operation

matic door engines. These are controlled by two air valves placed in a convenient position, one above the other, at the left of the air-brake valve. By a single movement of the operator's hand both doors can be opened. On each door engine is a switch which controls red and green lights placed in a small metal box on the front center window post immediately in front of the operator. If a door is open, a red light is shown, and when closed, a green light appears.

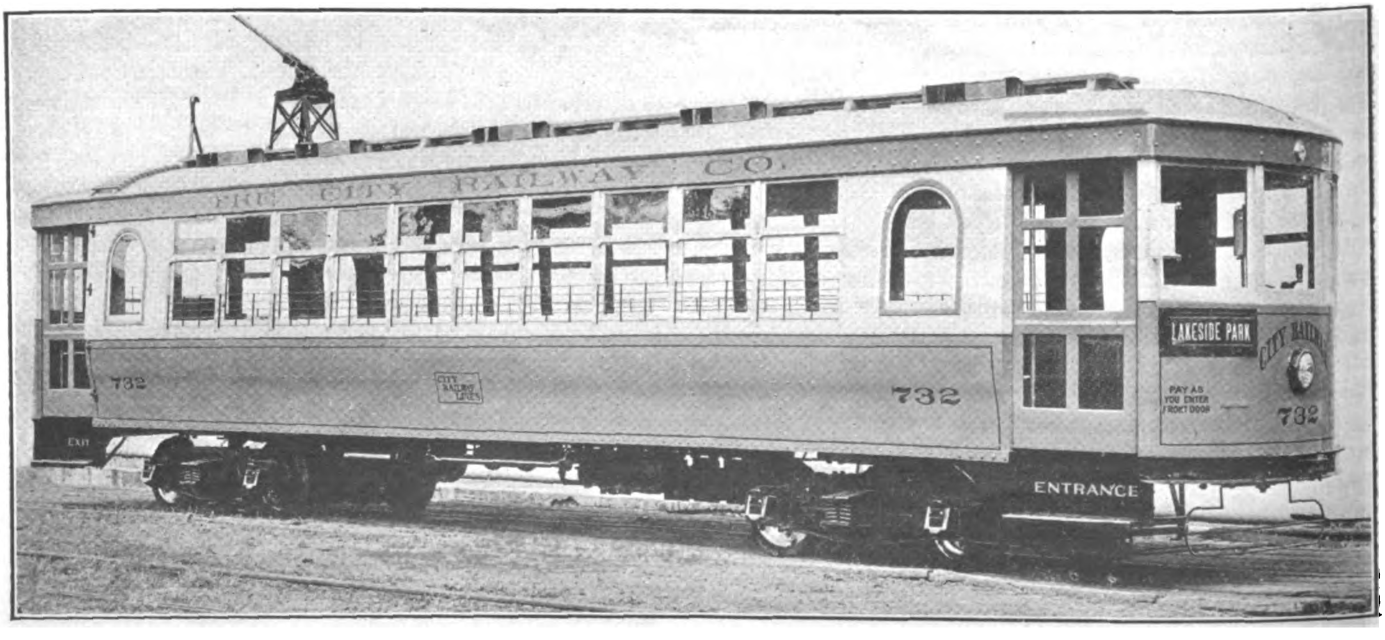
In addition to the inside and outside mirrors, each car is equipped with a row of five electric lamps over the rear door. These are placed in the letterboard panel and are controlled by the door switch. At night when the door is opened the lamps are lighted, producing a flood of illumination around the outside steps. The lighted area extends for a distance of 15 or 20 ft. and materially assists the operator in determining when the passengers have alighted.

The double-truck one-man cars were equipped with Syracuse turnstiles at the rear end, located as shown in an accompanying illustration. At heavy loading points, in Dayton, it frequently happens that twenty or twenty-five passengers leave the car at the same time. If it were necessary for them all to leave by the front door, confusion and delay would occur, because even with a double front door, only a small number of passengers can board the car before they come into contact with outgoing passengers in the aisle. The method followed, however, has been found to eliminate this difficulty altogether. Another advantage is that passengers move toward the rear of the car, where they will alight, and the entrance is thus kept clear.

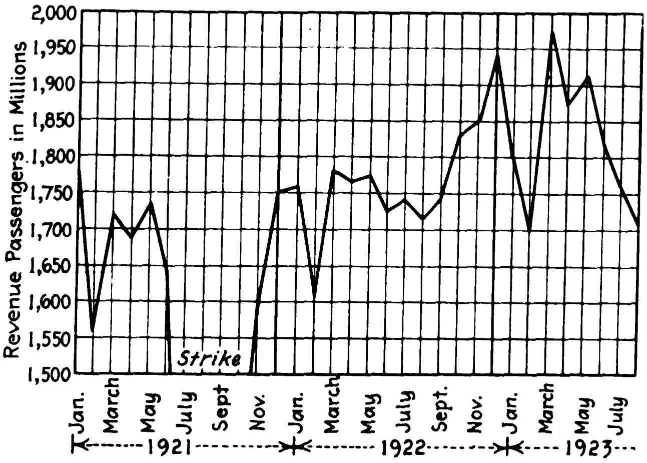
How Car Requirements Were Met

When the City Railway commenced one-man operation, it was decided to rebuild all its cars, because they were very much in need of it, and also to purchase fifteen new light-weight cars especially designed for that method of operation. The latter have already been described in the ELECTRIC RAILWAY JOURNAL, issue of Oct. 28, 1922. As the company's shops were not fitted for such general rebuilding, the work was done at the shops of the Oakwood Street Railway, Dayton. A single car was first entirely rebuilt, repainted inside and out, and completely equipped as a sample of the type to be operated. This model was then approved by the City Commission, and the company began publicity work to tell the general public what it intended to do and how it expected to give better service.

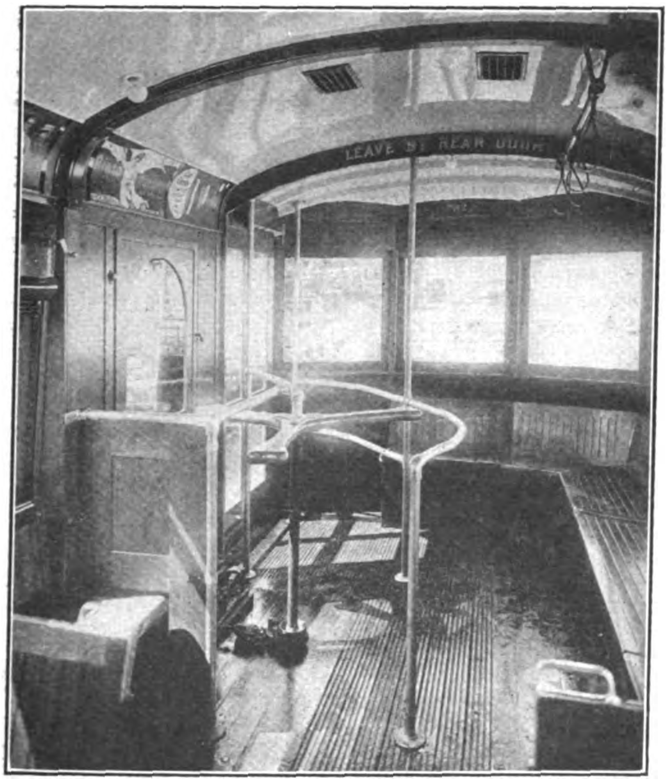
At the start the model car was placed in service with two men, operating on No. 1 run on the best line in the city of Dayton. The company's object in stationing



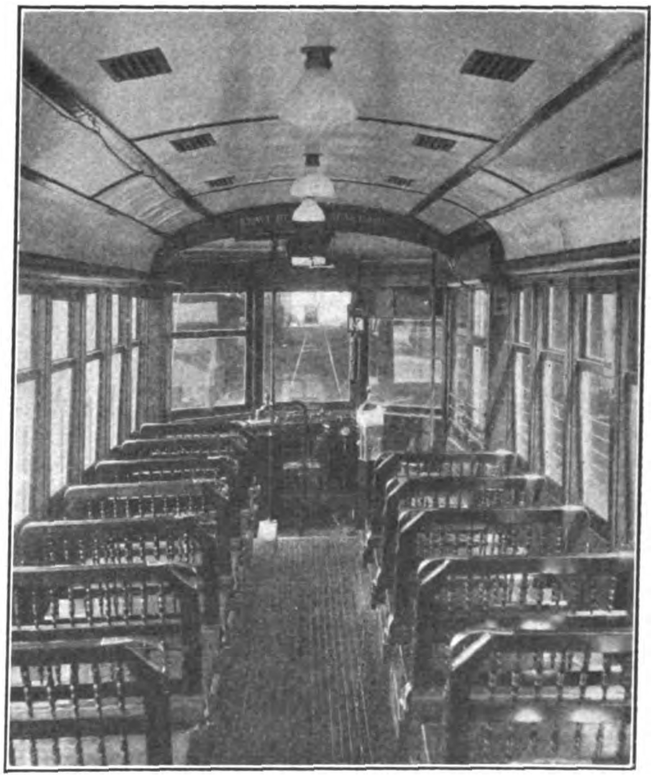
Ten More Cars of This Type Were Put in Service Recently two men on the car was to have the second man stand in the rear and in case any one started to alight by the front door he could call out "Rear door, please." These two men alternated in running the car, and by this means, both became expert at it. The car was operated for three days on this run and then put on No. 2 run, the crew of the latter run having been broken in during this period. In this way, all of the crews on runs from 1 to 12, on that line, were instructed in the new operation of cars. At the same time, the public became quite familiar with it. On Sunday, July 23, 1922, when travel was light, a complete equipment of new cars was installed on one line. The same method was followed to inaugurate one-man service on the other lines in the city. At the present time, the company is operating 100 per cent one-man service with double-truck cars.



Curve Showing Trend of Revenue on Dayton City Railway



The Removal of the Turnstiles Installed at Rear, as Shown Above, Has Been Made



Interior of Older Type Car Rebuilt for One-Man Operation

SAVING IN PLATFORM EXPENSE

The wage scale in effect after the strike beginning in July, 1921, was 41 cents per hour for the first three months, 43 cents per hour for the ensuing nine months, and 45 cents after the end of the first year. This was later increased to 46, 48 and 50 cents per hour respectively, when one-man operation began. In June of the present year, the company voluntarily increased wages to 51, 53 and 55 cents per hour for the one-man operators.

The percentage in saving of platform wages for the first eight months of this year, compared with the corresponding months of 1922, was as follows: January, 36.4 per cent; February, 36 per cent; March, 37.2 per cent; April, 39.8 per cent; May, 37.7 per cent; June (increased wages), 33 per cent; July, 33.8 per cent; August (extra time for change men in the rush hour), 29.6 per cent.

All the expenses of reconstructing the old cars, as well as the purchase of new cars, have been paid for by the saving in wages and operating expenses and by the increased traffic resulting from improved service. The number of revenue passengers has increased to a gratifying extent. This trend is illustrated in the accompanying chart. The City Railway believes that its success in this venture has been due not only to the front-entrance and rear-exit plan adopted, but also to the thorough education of the public, the careful training of the operators, and attention to small details of equipment. The riding public is well satisfied with the service, and the operators would prefer to resign their jobs rather than return to two-man operation.

No better proof of the success of one-man operation in Dayton is possible than an examination of the financial results therefrom. Besides paying for the reconstruction of the old cars, as already stated, and the purchase of new cars, the railway has paid 6 per cent on the preferred stock and 3 per cent on the common stock.

When all service was performed by the two-man cars, the company had 240 platform men. At the present time, with 100 per cent one-man service, the number is 126, which includes six flagmen for railway crossings. At the time of the change, all regular runs were replaced by one-man cars on a car-for-car basis, with the same number of swing runs, but extra trippers added for the evening rush hour. This was done to give the better service which the company promised when making the change. Inasmuch as the change was made gradually, no actual release of employees from service was required, but the company simply ceased to employ new men as employees turned in their resignations. This method worked out to the mutual satisfaction of the railway and the platform men.

Some Operating Details

With two-man operation the average schedule speed of the lines of the City Railway was 9½ m.p.h. Since the inauguration of one-man operation, no change has been made in this schedule. In fact, one of the problems has been to keep the operators from running ahead of time. Since he is in sole charge of the car, the operator does not now have to wait for a signal from the conductor, and this saving in time has resulted in an actual increase in speed, rather than in a tendency to slow up operation.

In the matter of making change, the 5-cent fare has been a great advantage. During the rush hour, from 4:30 to 6 p.m., changemakers are stationed at the principal loading points. By making correct change for passengers before they board the car, they have speeded up operation to such an extent that actual records show a loading speed of thirty-five passengers per minute.

The issuance of transfers has been another problem. A machine is now being developed in Dayton, which is inexpensive and it is hoped will prove satisfactory. Experiments are being tried with it on the Oakwood Street Railway.

Ordinarily, all switches are controlled from inside the car, by using a switch iron through a hole in the floor. During the evening rush hour, however, switchmen are stationed at important points to throw the switches. They also serve as changemakers at these locations, and thus are an additional help to speedy operation.

When one-man service was first inaugurated all of the cars were equipped as noted previously, with Syracuse-type turnstiles at the rear doors. The public has now become educated to the method of operation, and the turnstiles are no longer considered necessary and are being removed from all of the cars. By taking them out, passenger interchange is accelerated, and at the same time valuable space inside of the car is regained. The removal was made also on the ground of public relations, and since their removal, the approval of the passengers has been clearly expressed.

Cost of New and Rebuilt Cars

The rebuilt cars are of three general types, those designated as Barney & Smith cars with a narrow platform, a wooden type built by the Cincinnati Car Company in 1909, and some modern steel cars. Five out of twenty of the latter type have been rebuilt at a cost of $2,000 each for the body, outside of trucks and electrical equipment, and the weight reduced 4,500 lb. by changing the type of motors and trucks. The wooden cars were rebuilt outside at a cost of $4,825 each, which includes an overhead charge of 100 per cent. The cost of converting the older Barney & Smith cars varied somewhat in price, on account of the installation of electric heat in four of them. The price of the new light-weight cars was $9,971 each.

In all of the cars there has been installed, for emergency, a conductor's air valve in the front vestibule, operated by a red cord running along the molding. This cord has pull-handles at the front, middle and rear of the car, labeled "For Emergency Only." When the cord is pulled, exhaust air actuates a circuit breaker knockout, which shuts off the current, applies the brakes and balances the door engines in the same manner as in the standard safety car.

Ten new steel light-weight cars of the type shown in an accompanying illustration were put in service during September of this year. The use of all single-truck cars has now been discontinued, and fifty of them were burned a short time ago, after all available material had been salvaged. Enough plate glass was secured to equip all of the new cars, and in addition there remained a plentiful supply for future replacements.

During the past year the company has been operating with an insufficient number of cars to provide adequate service. Passengers have been crowded in to such an extent that it has been difficult to close the doors. While the undesirable features of such an arrangement are freely admitted by the railway, nevertheless this has served as an excellent test of the value of one-man cars in heavy traffic. Although the population of Dayton is only 160,000 and there are five separate railways operating within the city, nevertheless the City Railway carries an average of 60,000 passengers on week days, and on Saturdays from 75,000 to 80,000.

The public has been pleased with the one-man operation; the platform men are thoroughly satisfied with it, and the number of accidents has decreased. The financial results have been so good that the old rolling stock has now been entirely rebuilt or replaced by new cars. It is therefore felt by the company that the success of the experiment begun a little more than a year ago has now been thoroughly established.

New Safety Organization on Beaver Valley Traction

EX-MEMBERS of the safety committee of the Beaver Valley Traction Company, New Brighton, Pa., determined to keep in touch with the safety work that is being carried on, have formed a new organization known as the "Veterans' Association" of the safety committee, which is sponsored by H. O. Allison, safety engineer.

The safety committee is elected by a vote of all the employees. Membership in the Veterans' Association is limited to those who have served at least one full term on the committee. If any member is re-elected to the safety committee he automatically loses his membership in the Veterans' Association. The purpose of the new organization, of which W. F. Allshouse, track foreman, is president, is to carry on the safety work, and functions as the "Senate of Safety" for the road. Thus has it been exemplified that interested employees who possess initiative will respond when there is a real need for their work. That the safety work pays is attested to by the following statement issued by W. H. Boyce, general manager:

"Organized safety work has resulted in the reduction of our accident costs from 8 per cent of the gross, which was the average for a ten-year period, to 2.42 per cent of gross in 1920, and 1.89 per cent in 1921."

Using the Streets for the Greatest Good of the Greatest Number*

By J. Rowland Bibbins
Consulting Engineer, Washington, D. C.

Traffic Conditions in Several Cities Are Cited as Typical of the General Problem — The Subject of Expediting Traffic Movement Is Looked at in a Broad Way, from Which It Is Noted that However Important Are Other Phases of City Planning, Transportation Must Be Considered as a Fundamental

IT SEEMS high time for those concerned in the serious study of city and transportation development to make a new appraisal of present conditions and future possibilities, for the conflict of interest of those using the public streets has become a veritable battle for supremacy. "Traffic" has become a regional as well as a local problem, and future growth must be met more frankly and scientifically than in the past.

ELEMENTS OF THE PROBLEM

In general, the elements of the problem are as follows:

1. Transit service—capacity and routing.
2. Street traffic control—vehicle and pedestrian.
3. Rail and marine traffic—provision for special needs.
4. Street and highway plan—capacity for present and future.
5. Pedestrian movement.
6. Relation to the broad city or district plan and the general public welfare; special needs of the office, wholesale, retail, warehouse and industrial districts; also the purchasing power of the city for public improvements as measured by its increasing revenues from taxation of private property.

SOME TYPICAL CONDITIONS

Chicago has attempted literally to serve an area of over 200 square miles by a central district eight blocks wide by twelve blocks long. But business has now burst through these fictitious boundaries, after facing an economic loss estimated by the City Plan Commission at $60,000,000 a year from traffic impedance due alone to parking in a lineal street frontage of only 110,000 ft. A thirty-minute day and no-parking rush hour traffic ordinance has improved conditions, but 300,000 cars in the Chicago district call for accommodations upon the public streets for business and pleasure.

Baltimore recently found in its business district 152,339 vehicle movements and only 21,036 street car movements, and that during the rush these vehicles handled only 11 per cent of the total passengers carried, while the street cars handled 89 per cent.

Detroit has developed a northerly sub-center of unusual size, Highland Park, but here, at the principal exit from the Ford Motor Works, a rush-hour traffic is found averaging eighteen seconds headway per street car, two seconds for vehicles, and from 0.1 to 0.2 second for pedestrians; i.e., about 200 street cars, 1,800 motors and 10,000 to 20,000 pedestrians per hour.

Montreal, at its three most important street crossings, finds 75 per cent more vehicles than street cars, but these carry only 7 per cent of the passengers carried by cars. And during heavy winter snowfall, practically all traffic is confined to the car tracks for long periods. Motors have multiplied five times in six years and trucks nearly doubled in two years. There are only three main highway entrances to the city, one from the south; but over 80,000 United States automobiles enter Quebec Province during the summer, mostly reaching Montreal. Yet Montreal has only one main traffic street with roadway as wide as 54 ft., necessary for free two-way traffic with street cars and parking, and this street is used for heavy freight traffic between east and west side railroads and industrial districts as well as for the street railway terminal trunk lines.

Los Angeles is striving to work out of its tangle of motor traffic, superimposed upon its street railway and heavy interurban train movement through the streets. It has been recently proposed seriously to exclude street cars entirely from the central business district, using a belt-line transfer instead.

A large proportion of the through interchange l.c.l. freight movement between Chicago railroad terminals is still handled through the city streets by trucks. In Cincinnati practically all l.c.l. interchange freight, formerly handled by trap cars, is now motored through the streets by the shortest route.

These are not far from typical conditions throughout the country in the larger cities. The two most serious tendencies have been the general resistance to any change or betterment except at the "other fellow's" expense, and the very general recourse of city authorities to sudden and drastic prohibition in one form or another in the use of the public streets.

GROWTH AND THE FUTURE

It is probable that by 1940 our population will approximate 130,000,000 people, of whom 70,000,000 or more will reside in the cities. Railroad freight tonnage is increasing proportionately as the cube of the population or nearly so; ton mileage is increasing much faster. Thus, terminal tonnage is a problem proportionate to the cube of urban population, at least for a time. Trucking tonnage will probably increase as fast; for, except that which moves car-load direct from origin to final destination, the entire rail tonnage must be carried over our streets and highways one or more times, according to the number of fabrications.

The paradox of transit traffic increasing as the square of the population still continues in New York City, and in most cities it is at least following a geometric

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*Reprinted from the *American City Magazine*.

progression, rather than straight proportion. Motors are increasing far beyond the fourth power of the population, and it is found in some cases that the total movement each day in and out of the delivery district of a large city is equal to, or greater than, the number of car registrations for the entire city. Pedestrian traffic seems to be hopelessly crowded into the background.

On the other hand, fixed traffic facilities, such as streets, tracks and terminals, are only slowly increasing —hardly as fast as the population, if at all—while the traffic itself is increasing in geometric ratio to the population. Meanwhile, city authorities hesitate to undergo apparently expensive improvements, although clearly running the risk of vastly greater expense later, due to the rise in property values. And here is the one fortunate aspect. For the assessed value of property in our cities is increasing at about 1.7 power of the population, in some cases faster than the square. This growth is generally stable and a reasonably sure index, and should offer great encouragement to careful study and prompt action.

SUGGESTIONS FOR CONSTRUCTIVE ACTION

From these facts it is clear that the immediate and future problem is largely a terminal one. It has been greatly neglected in the past and left entirely in private or corporate hands or to the carriers themselves. Few cities have even gone so far as to develop bypass traffic streets and highways,* and in a recent 2,000-mile auto trip in the East the writer did not see a single sign at the entrance to a city reading "Heavy traffic detour this way."

There are many avenues for constructive action, immediate and future, which ought to be based upon ascertainment of definite facts first. The general idea of decentralization is of course good, but even subcenters have to be planned in advance. Thus, the problem of Highland Park, Mich., is already as large as the central district problem of a city of a million or more.

The thoroughfare plan is most important. We now know that the old decimal system of 40, 50, 60, 80 ft. widths has little merit as a measure of real traffic capacity. Sidewalks and obstructions must give way and arcading of highly developed narrow streets may often have to be resorted to, to widen the roadway and still give opportunity for full development of air rights above. The constant extension of building heights is a ruinous civic policy. Some office buildings are now being built with automobile storage for their tenants in the basement.

The "twilight zone" surrounding the business districts of all large old cities offers an unusual opportunity for development of marginal long-time storage facilities for business cars; and in cities of rugged topography, hillside garages with entrances from two or three levels can be built and operated at far less cost than the ramped buildings now being built. Limited parking must be adopted, but rigid prohibition is obviously the wrong method, at least until our citizens become rich enough to have their own chauffeurs. In every city many idle spaces can be developed, at least temporarily, for pay storage at moderate rates; and underground storage in large public areas, such as the ideal situation in Grant Park, Chicago, remains to be developed.

With a reasonable accommodation of essential motor traffic, it will be found that the problem of street car movement will unravel itself through better operation, now almost impossible, and rapid transit. Singularly enough, the value of prepayment loading stations for street cars at large industries and other heavy transit points, for speeding up the line, has been too often neglected by both transit companies and industries. Electric railways still exist as our major hope of mass transportation, but they cannot function unless given the right of way which is proper under our democratic code of life—the greatest good of the greatest number. The fuller development of strategic railroad entrances, available in many of our large cities for combination railroad, rapid transit and motor ways, is a public resource of immense value to which immediate thought should be given; for this policy will save tremendous investment in otherwise duplicated facilities, or, conversely, provide more facilities for the same money.

Perhaps the greatest immediate need of the railroads is to apply a "suction pump" to their terminals to get the freight away. In other words, off-rail movement is perhaps equal in importance to overland movement. In the aggregate, half of the total transport cost, origin to destination, is off-rail. The efficient organization of this great off-rail movement in our cities is a problem that has been almost wholly lost sight of, except in a very few cases.

To this end there must be brought about some reasonable form of general terminal unification—at least in operation, if not in ownership and control. Probably half of the investment in railroads today is in other than main-line track, namely, terminals, and the proportion of new capital therein is increasing and necessarily must continue to do so. Coupled with a real organization of off-rail motor movement, terminal unification offers perhaps the greatest opportunity of the future for increasing the efficiency and revenue-earning capacity of railroad investment. And in the face of the present astonishing growth of rail tonnage, some such plan may soon become imperative. Zoning of commercial districts, including terminal, port and harbor operations, has also become a definite need.

The reclamation of land values, especially in railroad terminals, surrounded as they are by highly developed areas, again offers future possibilities difficult to exaggerate, and one of the most important financial resources now available to the railroads. It is almost axiomatic that rise in land values must eventually force a recession of freight facilities (and possibly passenger facilities) through the agency of motors, just as in other normal real estate development. Store-door delivery will simply accelerate this rational process.

In these necessary great public improvements of the future, part solutions are dangerous, as the various factors are so inter-related. In rational terminal evolution (used in the broader sense), rail, motor, trolley, barge and ship must each play their logical part. If a reasonable system, similar to our present local district assessment method, is worked out on a basis of true cost and benefit, with excess condemnation where it is obviously essential to insure correct development, the future growth of our cities will not prove so distressing a problem as in the past. However important other phases of city planning, transportation must be recognized as having a more definite place in the general perspective. It is not a detail; it is fundamental.

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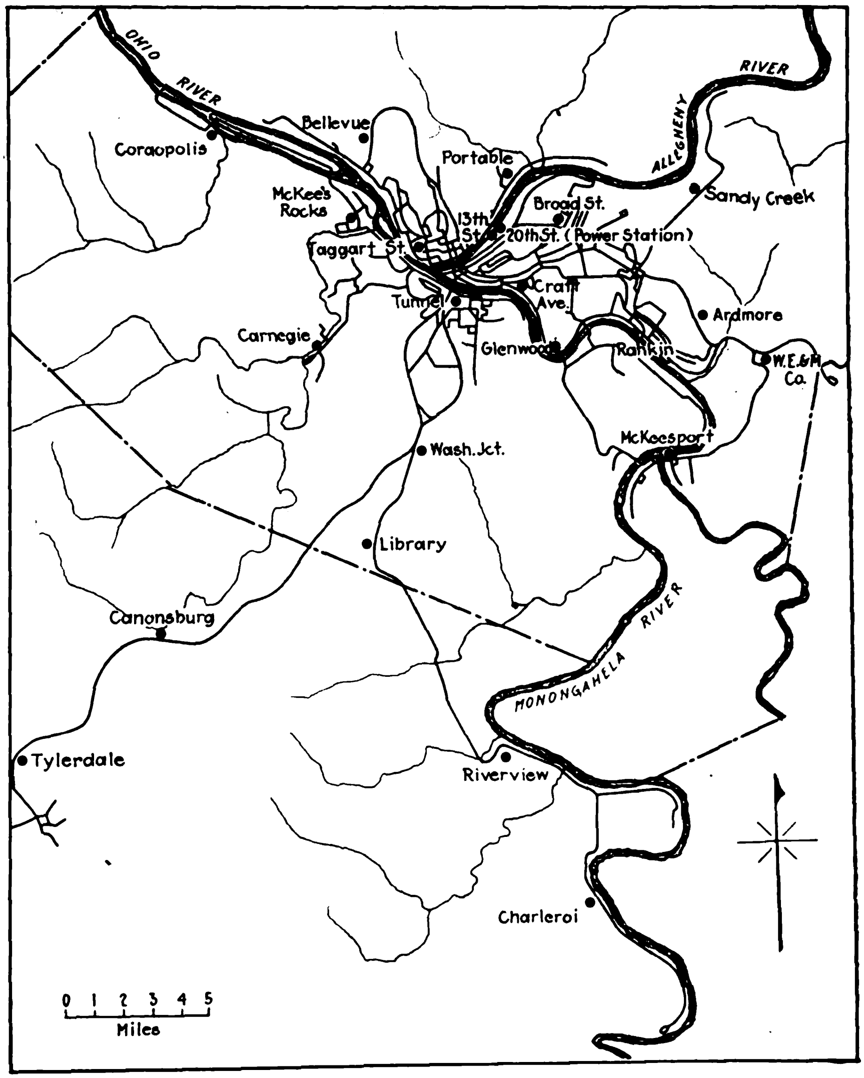
*But Baltimore has developed its "Falls Way"; Chicago, 65 miles of freight tunnel and its two-level Michigan Boulevard (South Water Street Extension underway); New Orleans, its Belt Railroad; St. Louis, its plan for motor freight to off-track inland stations.

Shunt Operation of Rotary Converters in Substations Effective

By R. J. Saulsbury
Chief Electrician Pittsburgh Railways

Pittsburgh Railways System Adopted Shunt Operation for 60-Cycle Converters Early in 1923—Time of Power Outages During First Six Months of This Year Reduced to Less than Half that Occurring with Compound Operation Last Year—Flashovers Almost Eliminated



Map of the Pittsburgh Railways, Showing Substations

As the older direct-current power stations and motor-generator substation sets supplying the Pittsburgh Railways were replaced with modern 60-cycle rotary converters, it began to be noticed that the power supply was not as reliable as formerly. Outages became more frequent and flashovers were increased. Since the substations were tied in to a large alternating-current distributing circuit instead of being operated separately, these disturbances frequently affected large sections of the power system, rather than being purely local as in the past. After researches made under the direction of the chief electrician, it was decided to adopt shunt operation of all the rotary converter stations. The result was that difficulties of this sort were immediately reduced in number. Outages of any sort became the exception rather than the rule, and in a period of six months only three flashovers have occurred.

Extent of the System

The system of the Pittsburgh Railways comprises some 600 miles of track, the greater portion of which lies within the city of Pittsburgh, but important interurban lines reach Washington, Charleroi, McKeesport, Oakmont, Emsworth and Coraopolis. Originally these lines were all fed from independent direct-current power plants, but with the growth of the system it was not always possible to place a power station at a point where the supply was needed, owing to the absence of coal, transportation and water. This forced the adoption for some of the lines of alternating current, which was changed over for railway service by means of motor-generator substations. The main advantage of the motor-generator was the flexibility of operation and the possibility of using smaller reserve capacity. Some of these sets were driven by induction motors, but the difficulties experienced on account of low power factor and poor voltage regulation soon showed that the disadvantages of this type of motor outweighed the advantages, so that the design swung over to the synchronous motor-generator sets.

This was in the days of the earliest 60-cycle rotary converters. Increases in capacity of the system were made with this type of equipment, forming a secondary ring outside the metropolitan district. These 60-cycle converters operated very well with the remainder of the system, as they were usually connected to the metropolitan stations through single, long d.c. feeders, and could not exchange any great amount of load. Since these stations were each practically isolated, individual heavy-duty emergency storage batteries were connected with them. These batteries have since been removed from service.

The installation of larger and larger units of power

TABLE I—TOTAL NUMBER OF SUBSTATION OUTAGES PITTSBURGH RAILWAYS, 1922 AND 1923

	Twentieth Street	Thirteenth Street	Broad Street	Craft Avenue	Tunnel	Taggart Street	Total
1922							
January	0	3	0	1	1	1	6
February	0	0	1	1	1	2	5
March	0	0	0	1	1	1	3
April	0	0	0	0	1	2	3
May	1	3	1	1	2	2	10
June.	3	1	3	3	6	2	18
	4	7	5	7	12	10	45
1923							
January	0	0	0	1	1	0	2
February	1	0	2	1	3	1	8
March	2	0	0	0	1	0	3
April	1	0	0	0	0	0	1
May	1	0	1	0	1	3	6
June	2	1	1	1	3	1	9
	7	1	4	3	9	5	29

TABLE II—TOTAL MINUTES OF SUBSTATION OUTAGES, PITTSBURGH RAILWAYS, 1922 AND 1923

1922	Twentieth Street	Thirteenth Street	Broad Street	Craft Avenue	Tunnel	Taggart Street	Total
January	0	25	0	16	12	16	69
February	0	0	7	11	14	15	47
March	0	0	0	11	8	9	28
April	0	0	0	0	3	26	29
May	20	48	20	16	13	9	126
June	11	5	34	50	66	10	176
	31	78	61	104	116	85	475
1923							
January	0	0	0	10	7	0	17
February	7	0	13	17	36	23	96
March	5	0	0	0	2	0	7
April	2	0	0	0	0	0	2
May	2	0	2	0	5	14	23
June	10	14	13	8	30	8	83
	26	14	28	35	80	45	228

supply, which took place when the power plants of the railway were placed under control of the Duquesne Light Company in 1913, introduced operating economies which made it possible gradually to replace the d.c. power stations, some of which were by this time obsolete, with a.c.-d.c. substations. By this time some of the earlier operating difficulties of 60-cycle converters had been ironed out, and due to the greater efficiency and less floor space required, the standard was changed over to the rotary converter station. After 1915 all new stations erected were equipped with rotary converters, although additional motor-generator sets were placed in existing stations.

SUBSTATIONS NOW HAVE SUPERSEDED POWER PLANTS

At the present time all of the d.c. plants have been superseded with substations, with the exception of one at the heart of the downtown district, which still is maintained for stand-by service. The locations of the substations are shown on the map. There are now six stations feeding the metropolitan district, consisting of the d.c. power plant, whose capacity is 6,400 kw.; two rotary converter substations with a capacity of 15,200 kw., and three motor-generator substations with a capacity of 12,900 kw. Surrounding this central area there are eleven suburban stations, of which eight are rotary converter stations, having a total capacity of 13,300 kw., and three are induction-motor-generators with a capacity of 4,000 kw. In addition there are five interurban substations with a capacity of 4,100 kw.

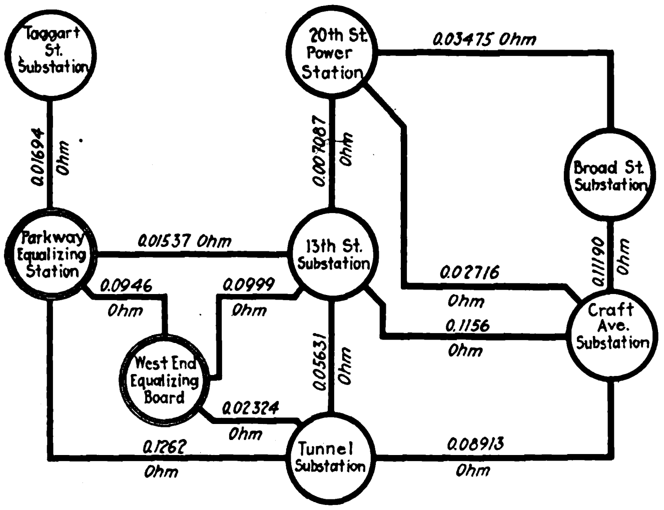


Diagram Showing Relative Resistance on D.C. Feeder System Between Substations

All the stations operate in parallel on the d.c. side and, with the exception of one, are fed from a common a.c. bus.

USE OF ROTARY CONVERTERS INTRODUCED NEW PROBLEMS

The change from isolated d.c. power plants to this combination of substations introduced some new operating problems. Any disturbance on the a.c. supply now affected the entire railway system instead of only isolated portions as formerly. This effect manifested itself in various ways. If the disturbance affected the voltage only, the load was shifted to the motor generators, whereas if the frequency dropped the load was shifted to the rotary converters. In the case of the induction-motor generators, it was even possible to have a momentary interruption to the a.c. supply without dropping the machine from the line.

At the same time this changeover from power plant to substation was taking place, extending as it did over a period of ten years, there had come about a great change in the transmission system, which supplied the stations. Whereas at first the substations were fed individually from separate transmission lines radiating from the a.c. power houses, today the substations are tapped off of a complicated interconnected system of 66,000-volt, 22,000-volt, and 11,000-volt transmission lines, practically all of which are operating in parallel at the separate voltages.

As the changeover approached completion, it was noticed that the power supply was not as reliable as formerly. On one occasion a failure at one of the smaller suburban substations spread out so that the load transferred to other substations opened feeder or machine switches at four additional stations, knocking them off like a row of dominoes. On another occasion a flashover in a metropolitan station dropped it from the line, kicked two others off completely, and pulled out feeders from three other stations.

The d.c. feeder distribution system, shown in an accompanying illustration, indicates the resistances in the tie line between the stations for the metropolitan district. A study of the distribution system showed immediately that compound operation, either of motor-generator sets or rotary converters, was undesirable. In case of trouble on the d.c. feeders, the tendency of the rotary converters was to pick up most of the load. This was due primarily to the low resistance between the d.c. buses and the various stations, which allowed considerable load to shift from one station to another in time of trouble.

In order to prevent this additional load from building up on one machine and pulling out another station entirely, it was decided to apply as far as possible the method of shunt operation to all of the substations. Shunt operation began early in 1923 at all of the substations on the Pittsburgh Railways except one where special conditions prevented it. The results were immediate and surprising. Outages of any sort became the exception rather than the rule. At the same time a more complete study of the a.c. power supply and the development and application of an adequate relay system to isolate defective lines resulted in a much more continuous supply of power. However, eliminating this factor entirely, and giving account only to those troubles occurring within the station itself or coming in over the d.c. distribution system, the results obtained exceeded expectations. Almost complete continuity of service followed, probably as near 100 per cent as will be possible in practice.

In the thirty days before shunt operation of nine converter stations there were sixty-two outages for a total of 401 minutes, thirty-four of which were flashovers. For thirty days after shunt operation began, there were twenty-five outages for a total of 151 minutes, of which only three were flashovers. It is not to be understood that all the above outages represent serious delays to service. In most cases the station was small and the outage affected only one or two cars, while in others one feeder was affected for a minute or two. However, the above figures for the two periods were made on the same basis, so that the results are comparable.

Shunt operation bettered the commutating characteristics of the machines in all the stations, so that higher time and current settings of the protective devices were permitted. The overload feature on the carbon circuit breakers on the d.c. side of the machine became practically unnecessary, as with reverse-current, overspeed, and overload a.c. devices the machines are protected adequately. Even where these latter devices were not in use, in such cases the d.c. circuit breakers were equipped with time delay devices and set to 150 per cent overload.

RESULTS ESPECIALLY GOOD ON NON-INTERPOLE CONVERTERS

The effect of shunt operation was especially noticeable in the case of the old non-interpole compound converters, on which the short-circuited series fields acted as a damping winding. The capacity of these old machines actually was increased, and it was possible to set the d.c. breakers to 200 per cent overload. Where before flashovers had been of almost daily occurrence, they now became extremely rare. At four stations there were sixteen flashovers in three months after shunt operation began, whereas for the corresponding time a year previous there were sixty-six flashovers at these same stations.

The elimination of rapidly fluctuating loads and of flashovers also has reduced maintenance costs. Brushes do not wear so rapidly nor do the commutators require so frequent dressing. The brush-holders and springs do not need renewal so often. No difficulties as to commutation, heating of fields or other operation have been experienced. Neither has there been any noticeable change in efficiency, even though particular attention has been paid to checking this item. A somewhat closer watch on the power factor must be made by the operator, but this is not burdensome. There has been no noticeable increase in heating of the tap coils.

The accompanying tables show the total station outages for each of the six city stations for the first six months of 1923, as compared with the corresponding data for 1922. The total number of outages has been reduced from forty-five to twenty-nine, while the time of the outages has gone down from 475 minutes to 228 minutes. While the mixed assortment of motor generators and rotary converters on a railway system is not desirable, yet with such a system the shunt rotary converter seems to be the logical cure for many of its operating ills.

Minneapolis Valuation Before Minnesota Commission

Cost to Reproduce the Property is Submitted by Engineer for the Company on Six Different Bases of Unit Costs—Going Concern Value Placed at $6,000,000

THE Railroad and Warehouse Commission of Minnesota opened hearings on Oct. 8 to determine the value of the property of the Minneapolis Street Railway. Upon the valuation fixed by the commission at this hearing will depend the rate of fare to be in effect in Minneapolis. The company now has a 6-cent fare, which is lower than that established in many cities of the size of Minneapolis, but the city is endeavoring to reduce this rate. The present case was started in 1921 and after a conference of the valuation engineers for the company and the cities of Minneapolis and St. Paul with the commission it was decided to make valuations of the property on five bases. The September, 1923, basis was added on account of the delay in beginning the hearings.

Mr. Drum of A. L. Drum & Company, consulting engineers, Chicago, on behalf of the company submitted to the commission valuations of the property on these six bases, which are itemized by classes of property in the accompanying table.

The property covered by the valuation comprises the entire street railway system located within the corporate limits of the city of Minneapolis. This comprises the property of the Minneapolis Street Railway, the Minnetonka line and the Como Terminal property. The Minneapolis Street Railway also operates two suburban lines extending outside of the corporate limits of the city of Minneapolis. These suburban lines comprise the Columbia Heights line and the Fort Snelling line. Passengers are transported for one fare on all lines located within the city limits and on the Columbia Heights and Fort Snelling lines extending outside the city limits. The present rate of fare on these lines is 6 cents.

An inventory and appraisal was also prepared of two other suburban lines extending outside the corporate limits of Minneapolis. These comprise the Robbinsdale and St. Louis Park lines, which are operated outside the corporate limits of Minneapolis by the Minneapolis and St. Paul Suburban Railroad for an additional 3-cent fare from the city limits to Robbinsdale and an additional 5-cent fare from the city limits to St. Louis Park, respectively. The inventory and appraisal were prepared so that each of the above described properties was treated as a separate and distinct unit.

THE COST TO REPRODUCE NEW AND THE ORIGINAL COST OF THE PHYSICAL PROPERTY OF THE MINNEAPOLIS STREET RAILWAY COMPANY, INCLUDING ALL PROPERTY IN THE CITY OF MINNEAPOLIS AND THE COLUMBIA HEIGHTS AND FORT SNELLING LINES EXTENDING OUTSIDE OF THE CITY LIMITS AS OF JAN. 1, 1922. THE VALUE OF THE ROBBINSDALE AND ST. LOUIS PARK LINES EXTENDING OUTSIDE THE 6-CENT ZONE LIMITS ARE ALSO SHOWN

	Pre-War Cost Average Prices 1911-1915	Ten Year Average Cost Average Prices 1912-1921	1921 Cost Prices Current July 1, 1921	Present-Day Cost Prices Current April, 1922	Estimated Original Cost	September 1923 Cost
Land	$1,290,140	$1,290,140	$1,290,140	$1,290,140	$1,290,140	$1,290,140
Track	4,907,581	6,770,165	9,241,657	7,849,115	7,105,466	8,644,720
Bridges, trestles and culverts	161,979	174,532	186,205	184,612	161,707	187,579
Paving	2,785,127	3,419,587	4,758,266	4,905,510	....	4,065,180
Electrical distribution system	1,781,668	2,446,108	2,637,380	2,418,537	1,814,322	2,871,321
Rolling stock	4,988,495	7,697,393	10,186,495	9,187,147	4,611,154	10,406,301
Power station equipment	2,598,670	3,510,810	4,452,096	3,947,139	2,646,147	4,077,698
Substation equipment	579,641	765,035	1,038,650	926,068	591,748	1,044,650
Shop equipment, miscellaneous equipment, departmental tools and supplies	273,001	395,851	491,402	409,502	273,001	510,512
Buildings and structures	1,494,826	2,117,356	2,560,325	2,386,685	1,361,767	2,560,299
Furniture and fixtures	81,613	130,580	179,547	155,064	81,612	190,302
General stores	790,073	790,073	790,073	790,073	790,073	790,073
Expenditures not apparent in inventory	391,724	391,724	391,724	391,724	164,305	391,724
Engineering and superintendence	1,106,227	1,494,968	1,910,198	1,742,066	1,044,572	1,851,556
Administration, organization and legal expense	749,602	842,157	943,291	920,177	744,045	938,925
Taxes during construction	310,378	412,039	565,940	565,940	310,378	566,476
Interest during construction	2,914,889	3,917,821	4,994,807	4,568,340	2,758,850	4,846,569
Working capital	492,151	492,151	492,151	492,151	492,151	492,151
Cost of financing	1,384,890	1,852,924	2,355,517	2,156,498	1,312,071	2,286,340
Total physical property inside present 6-cent zone	$29,082,675	$38,911,414	$49,465,864	$45,286,488	$27,553,509	$48,013,146
Robbinsdale line	53,523	72,603	98,838	85,749	48,868	94,633
St. Louis park line	49,197	66,923	91,413	77,740	48,558	85,757
Grand total	$29,185,400	$39,050,940	$49,656,115	$45,449,977	$27,650,935	$48,193,536

The total inventoried property principally consists of 227.764 miles of single track; paving; lands; power distribution system, consisting of overhead trolley, feeder lines, underground conduit and underground wire; rolling stock; carhouses, offices and miscellaneous buildings; a steam turbine power station supplying power for the operation of the Minneapolis, St. Paul & Suburban systems; six rotary converter substations and miscellaneous electrical equipment at the Lower Dam Water Power Station; furniture and fixtures; tools, etc.

The valuation of the physical property was made from a complete and detailed field inventory of the property. The cost to reproduce the physical property new represents the minimum amount of capital required actually to reproduce the physical property of the company as of Jan. 1, 1922, on the six different bases of unit costs.

WATER POWER LEASES AND GOING CONCERN VALUE

The value of the water power leases to the Minneapolis Street Railway was based on the saving they effect, this saving being computed on the basis of the total cost of the electric power purchased under these leases and the total cost of manufacture of that power if generated at a modern steam power station. The total saving to June 1, 1937, was prorated between the Minneapolis Street Railway, the St. Paul City Railway and the Minneapolis & St. Paul Suburban Railroad on the basis of the total kilowatt-hours used by each company. This element of value was included at $1,032,123.

The presentation of the claim for "going concern value" was made generally on the basis that the Minneapolis Street Railway had passed through the following stages of development:

1. Construction period.
2. Development period of construction.
3. The period of development into a successful going concern.

The engineer submitted that the fair going concern value of the property was determined to be not less than $6,000,000. One element in determining this going value was the historical development cost, which was summarized as follows:

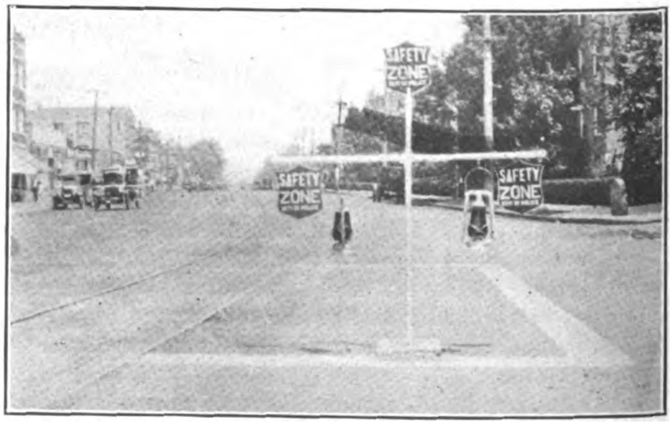
Horse, steam and cable lines, 1875 to 1891	$1,878,007
Initial electrical development, 1890 to 1903	2,628,800
Track renewed before end of useful life	1,332,803
Total	$5,839,610

Another element of going concern value submitted was that due to the consolidated operation with the St. Paul street railway system. This was given as not less than $2,000,000, measured by capitalizing the estimated saving per year to the Minneapolis company of the increased economy in operation due to such consolidated operation.

New Type of Safety Zone in Bridgeport

THE Department of Police in Bridgeport, in cooperation with the Bridgeport division of the Connecticut Company, has been installing a new type of safety zone illustrated in the accompanying engraving.

The area of the zone, which is about 12 ft. x 25 ft., is indicated by a stripe of white paint 1 ft. wide on the pavement. The peculiarity of the zone, however, is in the upright post. This is a 1-in. pipe painted white, about 4½ ft. high and fitted with long crossarms. Each of the latter carries a shield, as shown, with the following letters: "Safety Zone, Department of Police." Each arm also carries a red lantern for use at night.

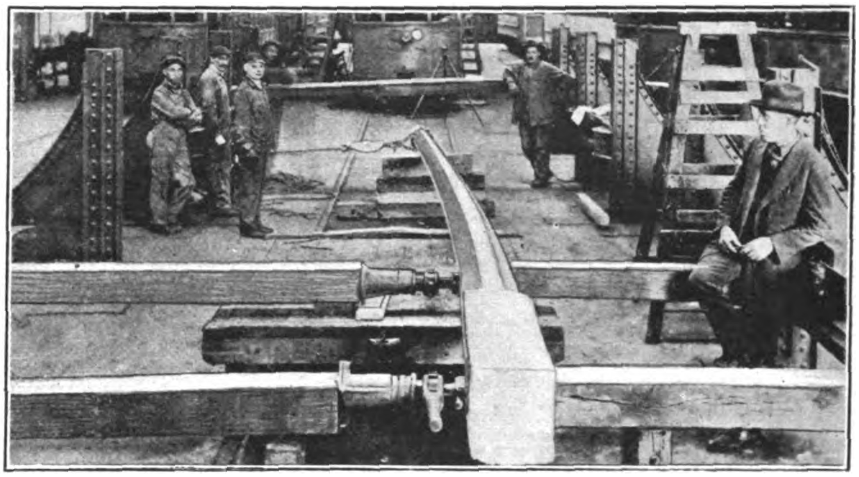


This Safety Zone Post Has Crossarms for Carrying Warning Notices and Lanterns

The post is supported in a cast base.

Cleveland Railway Studies Concrete Poles

Experiments Indicate that the Original Type of Reinforced Concrete Pole Contained More Material than Necessary to Secure Adequate Strength—Steel Poles Are Used on Curves and to Support Heavy Special Work



This Shows How the Concrete Pole Was Blocked in Between Two Pairs of the Stanchions Used in Straightening Car Bodies

AN EXTENSIVE series of tests has been made by the Cleveland Railway to determine the relative value of different types of concrete pole for use in overhead construction on tangent track. The primary object of the investigation was to design a pole of sufficient strength, but which would require less material in its construction than did the types previously in use.

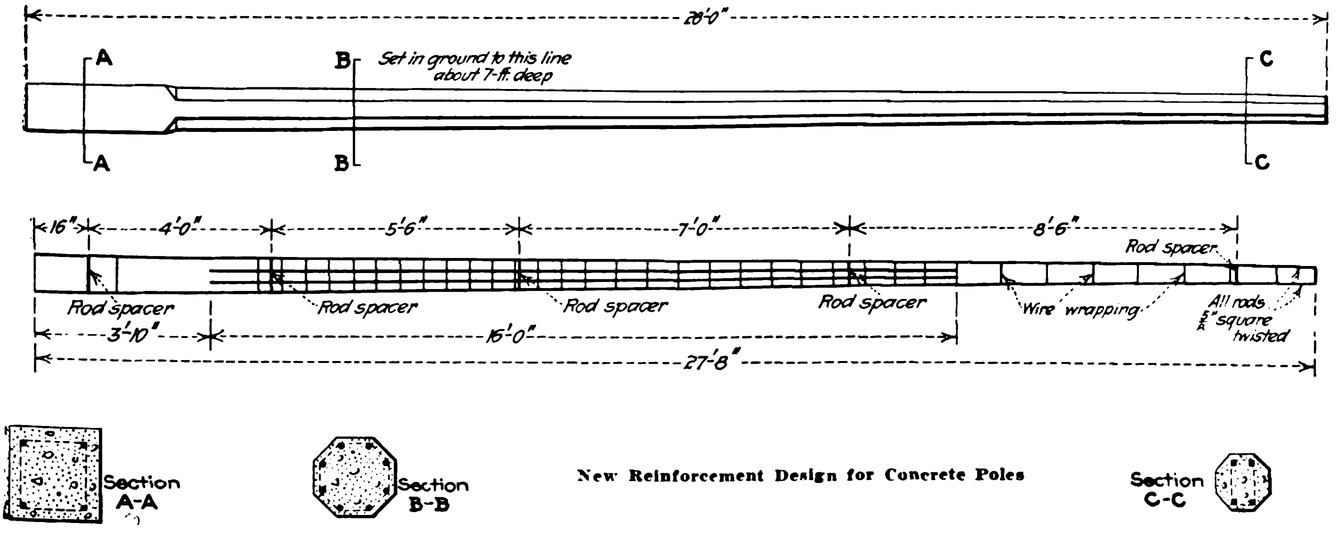
The first use of concrete poles by this company was in 1912, prior to that time all poles having been either wood or steel. Some of the latter were of small size, with only a 5-in. butt, although the more recent steel poles were larger. Many concrete poles are now used in Cleveland on tangent track, but steel poles are preferred on curves and for heavy special work, as it is believed that the former are not strong enough for such use.

The reinforcing design of the original concrete poles consisted of eight 27-ft., ⅝-in. square rods placed at the corners of an octagon. No transverse reinforcing was used. From an examination of poles constructed in 1912 and recently removed, it was found, however, that an additional rod not called for in the design, had been placed in the center of the pole. Only slight changes had been made in the design during the ensuing years, and the reinforcing in use at the time the tests were made consisted of six 27½-ft., ¾-in. square twisted bars, two ¾-in. square deformed bars 16 ft. long and one 1⅛-in. round bar 24 ft. long placed in the center of the pole.

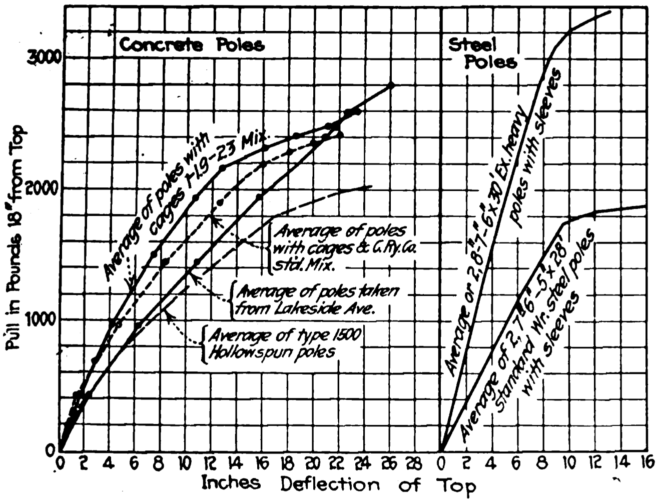
It was felt by the engineers of the company, as well as by the engineers of the city, that more material was being used in the construction of these poles than was necessitated by the strain to which they were subjected. The maximum loading on a pole used in tangent construction was estimated to be 1,000 lb. According to their theory there is 820 lb. horizontal pull of the span, 49 lb. wind load on the trolley wire and 135 lb. wind load on a 1,000,000 circ.mil cable, making in round numbers a total loading of approximately 1,000 lb. The point of application of this load was considered to be 18 in. from the top of the pole and 20 ft. above the ground line. The maximum bending moment to which the pole would be subjected is, therefore, 20,000 ft.-lb.

With these ideas in mind a new pole was designed, particular attention being paid to the proper distribution of steel. One less rod was embodied in the new design and all of the rods were of smaller size than had previously been used. In spite of that, however, the forecast was made that the new pole would fail in compression rather than in tension.

Uniform spacing of the reinforcing rods is achieved by spacer rings of ¼-in. round stock. The placement of rods in the concrete poles made up to that time had



New Reinforcement Design for Concrete Poles been more or less irregular. In the new method of assembling, four ⅝-in. deformed bars which are 27 ft. 8 in. long are first wired to the rings so that they form the vertices of a rectangle. After these are firmly fastened four other ⅝-in. deformed bars 18 ft. long are then wired to the rings. It was the contention of the engineers that steel placed in a transverse direction would be useful in giving greater strength to the cage. Soft iron wire No. 12 gage is therefore wrapped spirally the entire length of the cage with a space of 3 in. between turns. Difficulty was experienced at first in wrapping this wire so that it would bind the cage tightly enough to prevent its collapse. This was overcome by making with a pair of pliers, a kink in every slack turn of the wrapping wire and tieing it to the rods on every third turn. This drew the wire much more taut than could be done by hand and bound the cage so tightly that there was no possibility of its collapsing.



Average Bending of Concrete Poles and Steel Poles

After some practice in building these cages it was found that they could be made in about 3.6 man-hours. There seemed to be no reason to change the forms already in use and the old ones were accordingly used. In the present process the cage is placed in the forms first and the concrete is poured upon it. There is a slight tendency for the concrete to stick to the cage and not fill the form unless a stirring rod is used and the mixture poked around.

To change the kinds of material used in mixing the concrete for poles was not considered desirable. In the first place, the old materials were near at hand and easy to obtain. In the second place, a pole of light color and good appearance was desired and it was known that the old material would insure these conditions. Finally, the concrete mixing gang were experienced in the handling and use of these materials. It was decided, therefore, to use the same materials and change only their proportions in the mixture. The standard mixture in use before these tests were made consisted of 1 part of cement, 2.1 parts of sand and 1.3 parts of gravel. After extensive analyses, void determinations, etc., it was decided to use a mixture consisting of 1 part of cement, 1.9 parts of sand and 2.3 parts of gravel.

In order to compare the strength of these two concrete mixtures, six 6-in. tubes, three of the old mixture and three of the new mixture, were subjected to a crushing test, twenty-eight days after being poured. These tests showed a strength of 3,690 lb. per square inch for the new mixture and 2,370 lb. per square inch for the old mixture.

The apparatus used for testing the strength of poles is shown in the accompanying illustration. The butt is blocked in between the stanchions used in straightening car bodies. Poles are blocked at the extreme end and again at the ground line, 6-in. x 6-in. timbers and a screw jack being used in each case. The load is applied by means of a chain fall fastened at one end to the stanchions and at the other end to a point 18 in. from the top of the pole. A dynamometer is placed in line next to the pole, so that the exact magnitude of the force being applied at any particular moment can easily be determined. The deflections of the poles under load are read by means of a transit.

As a typical example of the experiments, we may take a test of a pole with the 1-1.9-2.3 mixture and the new cage. This pole was 11 in. square at the butt and 10 in. square at the ground line. A load of 500 lb. was first applied, causing a deflection of 1½ in. Thereafter the load was increased in increments of 500 lb. until a total of 2,000 lb. was reached. Deflections were respectively 4 1/16 in., 6¾ in., and 10¼ in. The load was then eased off to nothing, and it was found that the pole had a permanent set of ⅞ in. Then 1,000 lb. was applied, producing a deflection of 5⅜ in. After reapplying a load of 1,500 lb. the increments were 250 lb. at a time, producing deflections of 9¼ in. at 1,750, 10⅝ in., and finally 12½ in. at a loading of 2,250 lb., when small cracks began to appear in the concrete. At 2,400 lb. the pole failed before the deflection could be taken. The load was then eased off to 2,250 lb., when the deflection was 16⅜ in. Continuing to ease off the load, it was found that the deflection at 2,150 lb. was 28¼ in. When the load had been taken off altogether, the pole had a set of 16¼ in.

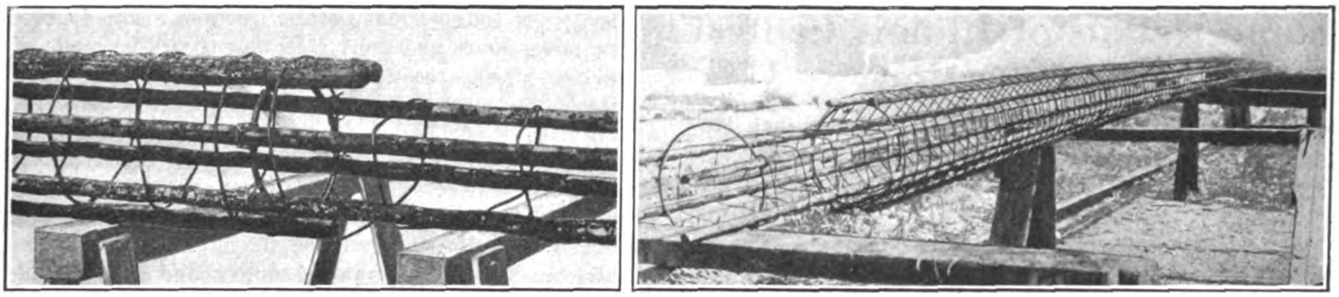
The method of testing was varied somewhat with the different poles, and a direct comparison of the loads carried by them would, therefore, be somewhat misleading. In some cases the load was increased by increments of 250 lb., and in other cases 500 lb. Moreover, with some of the poles, the experiment was tried of easing off the load to nothing at frequent intervals during the test. However, the behavior of the poles under the strain was sufficiently similar, so that a few general conclusions were possible.

CLASSIFICATION OF TESTS

The poles tested during this investigation may be classified in six groups. The first group consisted of old poles built and installed at various times since 1912. The dimensions of these poles varied somewhat, but in general they were approximately 11 in. square at the butt and about 9½ in. square at the ground line. They were built with the old reinforcing already described and the old concrete mixture was used. Seven such poles tested all failed on the compression side, at loads varying from 2,400 lb. to 3,000 lb.

The second group of poles to be tested consisted of those using the old concrete mixture and the new reinforcement. This type failed at an average load of about 2,400 lb., but the deflection was less until the breaking point was almost reached.

Poles using the new reinforcement design and the new mixture constituted the third class tested. These likewise all failed in compression as the engineers had foretold except for one pole which was found to have a defective cage. The loads ranged from 2,000 lb. up to



Cage Used in the New Pole

2,600 lb., the average load being closer to the latter figure.

Hollow concrete poles which were similarly tested compared well in strength with the solid poles, averaging slightly over 2,000 lb.

Two light-weight steel poles of the 7-6-5-in. type tested at the same time failed at identical loadings. Each of these poles was supplied with a protecting sleeve at the ground line and in both cases failure occurred at the 1,950-lb. load. Larger steel poles of the 8-7-6-in. type were similarly tested. They failed at 3,350-lb. and 3,475-lb. load. These poles were equipped with sleeves, as were the lighter steel poles, but were 30 ft. in length instead of 28 ft.

Inasmuch as the estimated load to which poles will be subjected is only 1,000 lb. and 20,000 ft.-lb. of bending moment, it will be seen from the accompanying chart that all types of pole were well above the strength required. The solid concrete poles all failed at loadings more than twice as great as that which they will have to carry in actual service. The conclusion was accordingly reached that the new pole with the new mixture was an improvement on the earlier design because less material is used in its construction.

COMPARISON OF MANUFACTURING COSTS

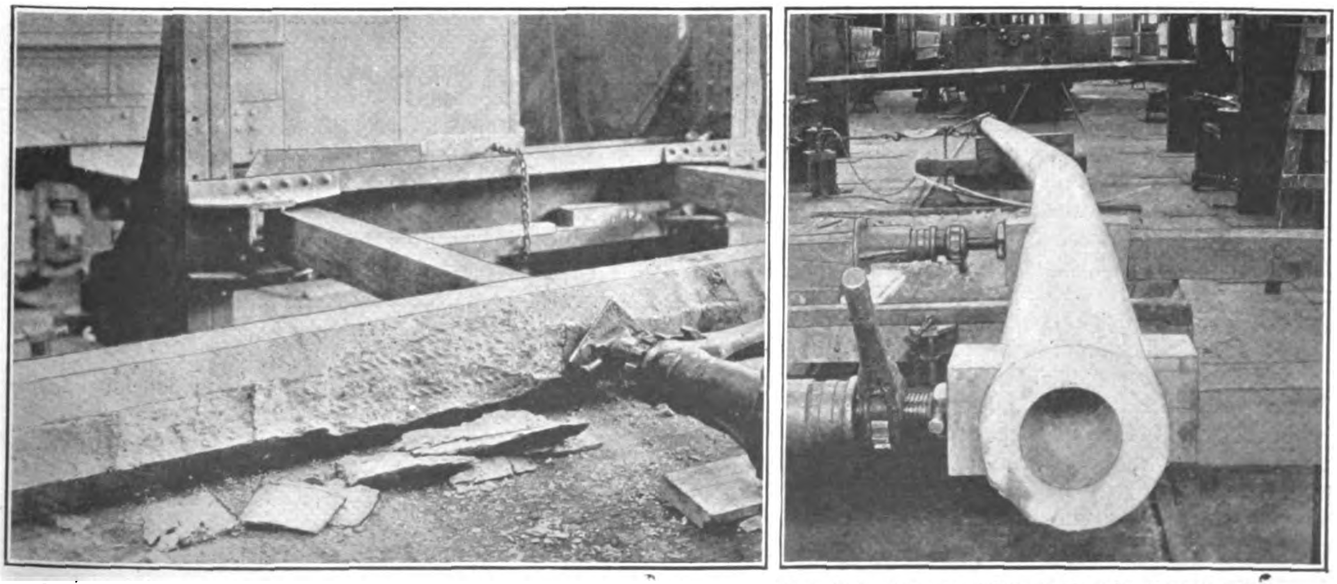
The next consideration covered in this investigation was the matter of cost. The older type concrete pole cost $21 to manufacture. The second type, with old standard mixture and new reinforcement, cost $18.60; and the new pole, $15.90. Thus the pole with the new reinforcing design and the new mixture is much more economical than previous designs of concrete poles. This pole supported so nearly the same load as the present pole that it was felt that its cheaper cost more than offset the slightly greater strength of the old pole and the future use of the new design was therefore recommended as a result of the investigation.

Salvaging Power Plant Stack Soot

THE Norfolk & Western Railway reclaims the soot which falls to the bottom of the one brick chimney which supplies draft for fourteen boilers at its power plant, located near Bluestone Junction, W. Va. Two of the boilers are at present being installed. The chimney is provided with a hopper-shaped bottom, which discharges the soot into a home-made steam ejector. This ejector consists of a 4-in. horizontal pipe, which turns upward into the central aperture of a standard T-fitting. A ¾-in. steam pipe leads into one of the other openings in the fitting, opposite to it being a 4-in. discharge to the coal elevator.

The jet of steam playing directly into the elevator pipe creates a powerful suction in the first mentioned pipe, which effectively draws the soot to the T-fitting, after which the steam current carries it along. Just before the soot reaches the coal elevators it passes through a water spray which condenses the steam and moistens the soot so that it does not blow out of the elevator buckets while being carried up to the coal hopper.

It is estimated that 60 per cent of the soot is combustible, and with the power plant operating at an average load (inflating with the full complement of fourteen boilers will be 8,000 boiler-hp.) probably 10,000 lb. of soot will return to the coal elevators in a week.



Left—Scaling Shows Start of Failure on Compression Side. Right—The Hollow Poles Compared Favorably with the Solid Poles

Some Details of Illinois Central Electrification*

Conversion to Electrical Operation to Embrace Approximately 418 Miles—Details of Plans for Power Generation and Transmission

By D. J. Brumley
Chief Engineer Chicago Terminal Improvement,
Illinois Central Railroad.

THE general construction program of the Illinois Central electrification in the Chicago district is as follows:

1. Complete the easterly side of a new through passenger terminal; complete the rearrangement of sewers and underground facilities; extend the track elevation and grade separation; make changes in grades that are necessitated by ordinance; be prepared to proceed with the work of electrification; and electrify the entire suburban service within seven years after February, 1920.
2. Electrify the entire freight service north of East Roosevelt Road within three years after the completion of the suburban electrification, or before 1930.
3. Electrify the entire freight service south of East Roosevelt Road within five years thereafter, or before 1935.
4. Electrify the through passenger service not later than 1940, if a certain proportion of the railroads using the lake-front passenger terminal station are operating electrically at that time.

The work of electrification contemplated embraces approximately 418 track-miles. The electrification system to be used was determined by a commission appointed by the railroad company. This body made a careful study of the Chicago terminal situation and compared it with the electrifications of similar properties in the United States and foreign countries. The commission recommended, and the Illinois Central Railroad adopted, the 1,500-volt direct-current overhead-contact system for use in the Chicago terminal area. The details for the electrical system are being worked out, and it is planned to begin partial operation of the suburban service about the middle of 1926. The generation of current can be provided for readily either along the shore of Lake Michigan, Lake Calumet, or the Calumet River, adjoining the electrically operated tracks, and be easily accessible to ample supplies of water.

For tractive power, high-tension alternating current, of probably 33,000 volts, will be converted to 1,500-volt direct current in not less than five substations on the railroad company's right-of-way. The conversion will be by rotating machines; the machines, transformers, switchboards, and auxiliary apparatus being housed in brick buildings of attractive design. The direct-current switching and protective equipment will be of the latest high-speed type.

The overhead system will consist of steel supports spaced approximately 300-ft. centers, for carrying the contact wires, transmission, signal, and miscellaneous power circuits. The overhead contact wires will be supported by messengers of high conductivity, so that over each track there will be sufficient conductor to supply the power required for that track, thus avoiding the necessity for independent parallel feeders. The contact wires, messengers and their attachment will be made of materials highly resistive to corrosion. The normal height of the contact wire above top of rail will be 22 ft., and it will be suspended from the messenger so as to make its alignment conform to that of the track it serves. As the electrification will be carried out in progressive steps, the spans constructed initially for the suburban electrification will be ultimately extended to include the freight, through-passenger, and such subsidiary tracks as will be electrified. The track rails being well bonded will form a return circuit for the propulsion current and will be cross-bonded at impedance bond locations, thus avoiding any interference with signal track circuits.

SUBURBAN SERVICE WITH MULTIPLE-UNIT TRAINS

Suburban passenger cars are now being purchased for the electrified service, but are being placed temporarily in steam suburban service. The character of the suburban service is such as to make the multiple-unit train the most economical system. Provisions are being made for operating two-car semi-permanently connected units consisting of one motor car and one trail car.

These units will have control apparatus in one end of each car and will operate either singly or in trains of two to five similar units. The service provides for a high rate of acceleration and braking and a normal balancing speed of 57 m.p.h. on tangent level track. The motor cars will be equipped with four 750-volt motors connected in two groups of two motors in series per group with series parallel control.

The braking equipment will be the electro-pneumatic brake for multiple-unit service with a 1,500-volt motor-driven compressor. Power for the control and brake operation as well as for the car lights will be furnished by a motor generator set on the motor car, having a 1,500-volt direct-current motor and a 32-volt direct-current generator with storage battery provided as a reserve. The two-car unit will have a pantograph collector on the motor car only. Electrical heaters will be used, the details of which have not as yet been fully decided.

The cars will be equipped with diaphragms, enabling passengers to move safely and comfortably between cars and thus make advantageous use of all seats in the train. By the use of aluminum alloys and a careful redesign of the original steel suburban car, the weight will be reduced approximately 3,000 lb., reducing the trail car to approximately 89,000 lb.

As there will be no need to purchase electric locomotives for either through main-line freight service or switching service, or for the through passenger service, for several years, no attempt will be made to design such equipment at present.

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*Abstract of a paper which was published in the proceedings of the American Society of Civil Engineers for September, 1923.

British Roads Change to Electricity

Within the next two years the electrification of the three lines from Waterloo to Guilford (London & South Western Railway) will be completed. The London, Midland & Scottish group are beginning the change over on the line covering Manchester, Oldham, Middleton, Royton and Shaw, as a preliminary to larger developments. The same group intends to electrify the system to Rickmansworth.

Gross Revenue of Electric Railways Is Higher than in 1917

Census Figures of 1922 Are Given for Nine More States—Track Mileage Has Decreased Slightly and Net Income Is Lower in Some Cases on Account of Greater Operating Expense

PRELIMINARY figures of the electric railway census for last year have now been released for several states in addition to those printed in this paper Nov. 3. In a group of seven states west of the Mississippi River there has been a slight decrease in track mileage in every one except Minnesota. The number of revenue passengers, however, has increased in Arkansas, Nebraska, Minnesota, but has decreased in Kansas, Colorado, Arizona and New Mexico. Two of the Eastern states show decreases in track mileage and traffic.

Kansas.—The figures show a decrease of 3.2 per cent in track mileage and a loss of 5.7 per cent in the number of passengers carried. Gross railway operating revenues, however, show a gain due to fare increases of 26.3 per cent, and aggregated $4,527,397 in 1922 as compared with $3,585,079 in 1917, while railway operating expenses increased 46.6 per cent, and net income decreased 31.7 per cent.

	1922	1917	Per Cent of Increase, 1917-1922
Number of operating companies	†15	19	....
Miles of sigle track operated‡	543.15	561.00	*3.2
Number of cars, all types	613	607	1.0
Electric locomotives	3	5	....
Number of persons employed	1,346	1,680	*19.9
Salaries and wages	$1,773,652	$1,240,725	43.0
Primary horsepower, total	7,300	16,730	*56.4
Kilowatt capacity of generators	5,450	10,992	*50.4
Current generated, kilowatt-hours	11,224,902	21,677,157	*48.2
Current purchased, kilowatt-hours	27,122,697	30,687,892	*11.6
Passengers carried	43,575,343	46,212,673	*5.7
Revenue car mileage	12,037,274	13,819,088	*12.9
Railway operations, revenues	$4,527,397	$3,585,079	26.3
Railway operations, expenses	$3,366,397	$2,296,457	46.6
Net revenues, railway operations	$1,161,000	$1,288,622	*9.9
Auxiliary operations, revenues**	$281,562	$532,732	*47.1
Auxiliary operations, expenses	$217,264	$393,803	*44.8
Net revenues, auxiliary operations	$64,298	$138,929	*53.7
Net operating revenues	$1,225,298	$1,427,551	*14.2
Taxes assignable to railway operations	$337,353	$279,428	20.7
Operating income	$887,945	$1,148,123	*22.7
Non-operating income	$58,196	$58,963	*1.3
Gross income	$946,142	$1,207,086	*21.6
Interest and other deductions from gross income	$740,651	$906,269	*18.3
Net income	$205,491	$300,817	*31.7

† Three companies with 17.05 miles of track, which reported in 1917, discontinued operations prior to 1922, and the track of another company was operated under lease.

‡ Includes 47.39 miles in 1922, and 46.33 miles in 1917 lying outside the state, but owned by companies within the state, and excludes 85.44 miles in 1922 and 67.02 miles in 1917 operated in the state, but owned by companies outside the state.

** Chiefly revenues from electric light and power departments of electric railways.

Arkansas.—The figures show a slight decrease in track mileage, while passenger traffic increased by 11.8 per cent in 1922 as compared with 1917. Gross railway operating revenues aggregated $1,793,277 in 1922, an increase of 38.1 per cent, but on account of the more rapid increase in expenses the net revenues from railway operations decreased 12.3 per cent.

	1922	1917	Per Cent of Increase, 1917-1922
Number of operating companies	9	10	......
Miles of single track†	128.94	131.36	*1.8
Number of cars, all types	271	262	3.4
Number of persons employed	871	645	35.0
Salaries and wages	$1,151,530	$555,839	107.2
Primary horsepower, total	35,348	16,650	112.3
Kilowatt capacity of generators	25,550	12,457	105.1
Current generated, kilowatt-hours	56,562,946	33,080,677	71.0
Current purchased, kilowatt-hours	3,838,955	4,360,889	*12.0
Passengers carried	**34,131,000	30,525,360	11.8
Revenue car mileage	5,735,435	5,917,302	*2.8
Railway operations, revenues	$1,793,277	$1,298,744	38.1
Railway operations, expenses	$1,336,317	$777,773	71.8
Net revenue, railway operations	$456,960	$520,971	*12.3
Auxiliary operations, revenues‡	$1,497,270	$658,187	*127.5
Auxiliary operations, expenses	$682,087	$301,796	126.0
Net revenue, auxiliary operations	$815,183	$356,391	128.7
Net operating revenue	$1,272,143	$877,362	45.0
Taxes assignable to railway operations	$270,391	$162,366	66.5
Operating income	$1,001,752	$714,996	40.1
Non-operating income	$61,320	$33,336	83.9
Gross income	$1,063,072	$748,332	42.1
Deductions from gross income	$806,307	$497,291	62.1
Net income	$256,765	$251,041	2.3

† Includes 8.62 miles of track in 1922, and 9.53 miles in 1917, lying outside of the state but owned by companies within the state.

** In addition there were 661,405 passengers carried by eleven motor buses operated by electric railway companies.

‡ Chiefly revenue from electric light and power departments of electric railways.

* Indicates decrease.

West Virginia.—An increase of 6.8 per cent in track mileage and a gain of 18.6 per cent in the number of passengers carried occurred in this state. Gross railway operating revenues amounted to $7,057,025 in 1922, an increase of 41.2 per cent as compared with 1917, but on account of a more rapid increase in expenses (72.3 per cent), net income from all sources decreased by 47.5 per cent.

	1922	1917	Per Cent of Increase, 1917-1922
Number of operating companies	†16	19	....
Miles of single track operated in state‡	422.06	395.15	6.8
Number of cars, all types	573	633	*9.5
Electric locomotives	4	1	....
Number of persons employed	2,303	2,446	*5.8
Salaries and wages	$3,369,579	$1,787,466	88.5
Primary horsepower, total	81,375	35,042	132.2
Kilowatt capacity of generators	61,800	23,635	161.5
Current generated, kilowatt-hours	118,680,170	86,860,542	36.6
Current purchased, kilowatt-hours	47,607,035	25,300,487	88.2
Passengers carried	95,989,610	80,920,697	18.6
Revenue car mileage	15,238,374	14,622,900	4.2
Railway operations, revenues	$7,057,025	$4,998,377	41.2
Railway operations, expenses	$5,076,694	$2,946,622	72.3
Net revenues, railway operations	$1,980,331	$2,051,755	*3.5
Auxiliary operations, revenues	$1,756,886	$926,070	89.7
Auxiliary operations, expenses	$799,639	$413,675	93.3
Net revenues, auxiliary operations**	$957,247	$512,395	86.8
Net operating revenues	$2,937,578	$2,564,150	14.6
Taxes assignable to railway operations	$621,965	$365,798	70.0
Operating income	$2,315,613	$2,198,352	5.3
Non-operating income	$411,149	$942,906	*56.4
Gross income	$2,726,762	$3,141,258	*13.2
Interest and other deductions from gross income	$1,844,372	$1,459,777	26.3
Net income	$882,390	$1,681,481	*47.5

† Reduction in companies due to consolidations and reorganizations.

‡ Excludes 97.09 miles in 1922 and 78.11 miles in 1917 lying outside the state, but owned by companies within the state, and includes 3.82 miles in 1922 and 2.09 miles in 1917 operated in the state but owned by companies outside the state.

** Chiefly revenues from electric light and power departments of electric railways.

Mississippi.—A decrease of 21.4 per cent in track mileage, was accompanied by a loss of 30.9 per cent in the number of passengers carried. Gross railway operating revenues amounted to $692,298 in 1922 as compared with $617,527 in 1917, an increase of 12.1 per cent, and operating expenses increased 52.2 per cent during the five-year period.

	1922	1917	Per Cent of Increase 1917-1922
Number of operating companies	†7	11	.....
Miles of single track operated‡	96.55	122.79	*21.4
Number of cars, all types	130	187	*30.5
Number of persons employed	366	627	*41.6
Salaries and wages	$427,914	$392,600	9.0
Primary horsepower, total	4,500	16,035	*71.9
Kilowatt capacity of generators	4,500	12,575	*64.2
Current generated, kilowatt-hours	5,935,600	20,022,367	*70.4
Current purchased, kilowatt-hours	4,251,784	3,279,254	29.7
Passengers carried	8,441,459	12,215,749	*30.9
Revenue car mileage	3,075,482	3,990,356	*22.9
Railway operations, revenues	$692,298	$617,527	12.1
Railway operations, expenses	$751,884	$494,164	52.2

	1922	1917	Per Cent of Increase, 1917-1922
Net revenues, railway operations	††$59,586	$123,363	.....
Auxiliary operations, revenues**	$284,739	$585,515	*51.2
Auxiliary operations, expenses	$202,662	$395,842	*48.8
Net revenues, auxiliary operations	$82,077	$187,673	*56.3
Net operating revenues	$22,491	$311,036	*92.8
Taxes assignable to railway operations	$47,025	$59,503	*21.0
Operating income	††$24,534	$251,533	.....
Non-operating income	$975	$24,670	*96.0
Gross income	††$23,559	$276,203	.....
Interest and other deductions from gross income	$201,864	$395,645	*49.0
Deficit	$225,423	$119,442	88.7

† Four companies with 22.47 miles of track discontinued operations prior to 1922.

‡ Excludes 1.36 miles in 1922 and 1.38 miles in 1917 operated in the state, but owned by companies outside the state.

††Deficit.

** Chiefly revenues from electric light and power departments of electric railways.

Arizona and New Mexico.—The figures show a decrease in track mileage of 13.7 per cent and a decrease of 23.4 per cent in the number of passengers carried. Gross railway operating revenues aggregated $386,594 in 1922, a decrease of 13.4 per cent as compared with 1917. This decrease, accompanied by an increase of 10.4 per cent in operating expenses, resulted in a deficit of $130,025 in 1922 as compared with a net increase of $32,844 in 1917.

	1922	1917	Per Cent of Increase, 1917-1922
Number of operating companies	†5	6	......
Miles of single track	55.12	63.84	*13.7
Number of cars, all types	70	66	......
Number of persons employed	172	224	*23.2
Salaries and wages	$202,208	$221,711	*8.8
Primary horsepower, total	....	989	......
Kilowatt capacity of generators	....	665	......
Current generated, kilowatt-hours	....	1,526,960	......
Current purchased, kilowatt-hours	3,107,185	4,010,388	*22.5
Passengers carried	**7,271,456	9,488,467	*23.4
Revenue car mileage	1,391,248	1,729,926	*19.6
Railway operations, revenues	$386,594	$446,218	*13.4
Railway operations, expenses	$404,581	$366,337	10.4
Net operating revenues	$§17,987	$79,881	......
Taxes assignable to railway operations	$18,255	$19,979	*8.6
Income from other sources	$2,377	‡$76,910	*96.9
Gross income	§$33,865	$136,812	......
Interest and other deductions from gross income	$96,160	$103,968	*7.5
Net income	§$130,025	$32,844	......

†One company with 8.75 miles of track discontinued operations prior to 1922.

**In addition there were 42,960 passengers carried by two motor buses operated by electric railway companies in New Mexico.

§Deficit.

‡Includes net income from light and power departments to the amount of $56,590. There were no operations of this character in 1922.

Alabama.—The figures show a slight decrease in track mileage and a decrease of 5 per cent in the number of passengers carried. Gross railway operating revenues amounted to $4,904,276 in 1922, an increase of 37.8 per cent as compared with 1917, operating expenses increased 72.3 per cent and net income made a gain of 22.6 per cent.

	1922	1917	Per Cent of Increase, 1917-1922
Number of operating companies	†12	13	.....
Miles of single track operated‡	365.63	367.18	†0.4
Number of cars, all types	684	639	7.0
Number of electric locomotives	3	3	.....
Number of persons employed	2,581	2,129	21.2
Salaries and wages	$3,237,294	$1,645,028	96.8
Primary horsepower, total	29,805	38,702	*23.0
Kilowatt capacity of generators	22,375	28,100	*20.4
Current generated, kilowatt-hours	22,083,271	21,503,940	2.7
Current purchased, kilowatt-hours	144,199,062	94,718,843	52.2
Passengers carried	80,717,808	84,962,155	*5.0
Revenue car mileage	15,819,643	16,037,615	*1.4
Railway operations, revenues	$4,904,276	$3,559,064	37.8
Railway operations, expenses	$3,893,655	$2,259,414	72.3
Net revenues, railway operations	$1,010,621	$1,299,650	*22.2
Auxiliary operations, revenues**	$2,466,258	$2,048,681	20.4
Auxiliary operations, expenses	$1,203,956	$1,004,319	19.9
Net revenues, auxiliary operations	$1,262,302	$1,044,362	20.9
Net operating revenues	$2,272,923	$2,344,012	*3.0
Taxes assignable to railway operations	$623,448	$468,896	33.0
Operating income	$1,649,475	$1,875,116	*12.0
Non-operating income	$533,732	$36,325	1,369.3
Gross income	$2,183,207	$1,911,441	14.2
Interest and other deductions from gross income	$1,371,954	$1,249,582	9.8
Net income	$811,253	$661,859	22.6

† One company with 1.50 miles of track discontinued operations prior to 1922.

‡ Excludes 2.22 miles in 1922 and 2.17 miles in 1917 operated in the state, but owned by companies outside the state.

** Chiefly revenues from electric light and power departments of electric railways.

Minnesota.—The figures show an increase of 4.2 per cent in track mileage, and a gain of 11.2 per cent in passengers carried. Gross railway operating revenues amounted to $16,100,065 in 1922, an increase of 30.1 per cent as compared with 1917, but on account of a more rapid increase in expenses (46.0 per cent), net income from all sources decreased by 14.1 per cent.

	1922	1917	Per Cent of Increase, 1917-1922
Number of operating companies	10	10	......
Miles of single track†	697.14	668.94	4.2
Number of cars, all types	1,362	1,414	*3.7
Electric locomotives	3	1	......
Number of persons employed	4,930	4,970	*0.8
Salaries and wages	$7,582,904	$5,258,100	44.2
Primary horsepower, total	122,500	122,500	......
Kilowatt capacity of generators	91,400	91,400	......
Current generated, kilowatt-hours	145,675,347	152,469,348	*4.5
Current purchased, kilowatt-hours	22,455,451	23,860,491	*5.9
Passengers carried	‡352,464,915	316,904,581	11.2
Revenue car mileage	36,065,996	38,793,434	*9.6
Railway operations, revenues	$16,100,065	$12,375,143	30.1
Railway operations, expenses	$11,542,739	$7,905,772	46.0
Net revenues, railway operations	$4,557,326	$4,469,371	2.0
Taxes assignable to railway operations	$1,395,465	$1,064,065	31.1
Operating income	$3,161,861	$3,405,306	*7.1
Non-operating income	$99,127	$52,460	89.0
Gross income	$3,260,988	$3,457,766	*5.7
Deductions from gross income	$1,636,234	$1,566,115	4.5
Net income	$1,624,754	$1,891,651	*14.1

†Includes 29.08 miles in 1922, and 27.75 miles in 1917 lying outside of state, but owned by companies within the state, and excludes 12.83 miles in 1922, and 14.17 miles in 1917 operated in state, but owned by companies outside of state.

‡In addition there were 70,605 passengers carried by two motor buses operated by electric railway companies.

Colorado.—A decrease in track mileage of 7.8 per cent was accompanied by a loss of 10.8 per cent in the number of passengers carried. Gross railway operating revenues amounted to $6,704,377, an increase of 41.8 per cent, and net income from all sources made a gain of 110.7 per cent.

	1922	1917	Per Cent of Increase, 1917-1922
Number of operating companies	†13	15	......
Miles of single track	430.81	467.15	*7.8
Number of cars, all types	875	817	7.1
Electric locomotives	8	7	......
Number of persons employed	2,991	2,402	24.5
Salaries and wages	$3,648,898	$2,126,531	71.6
Primary horsepower, total	61,469	58,139	5.7
Kilowatt capacity of generators	44,855	39,770	12.8
Current generated, kilowatt-hours	108,493,550	98,227,472	10.5
Current purchased, kilowatt-hours	11,681,087	13,281,070	*12.0
Passengers carried	91,723,208	102,882,744	*10.8
Revenue car mileage	15,745,601	17,030,884	*7.5
Railway operations, revenues	$6,704,377	$4,728,732	41.80
Railway operations, expenses	$4,711,626	$2,974,853	58.4
Net revenues, railway operations	$1,992,751	$1,753,879	13.6
Auxiliary operations, revenues‡	$1,423,474	$1,051,044	35.4
Auxiliary operations, expenses	$791,903	$429,964	84.2
Net revenues, auxiliary operations	$631,571	$621,080	1.7
Net operating revenues	$2,624,322	$2,374,959	10.5
Taxes assignable to railway operations	$576,105	$532,848	8.1
Operating income	$2,048,217	$1,842,111	11.2
Non-operating income	$110,932	$46,736	137.4
Gross income	$2,159,149	$1,888,847	14.3
Interest and other deductions from gross income	$1,715,969	$1,678,481	2.2
Net income	$443,180	$210,366	110.7

†Three companies with 26.73 miles of track which reported in 1917 discontinued operations prior to 1922.

‡Chiefly revenues from electric light and power departments of electric railways.

Nebraska.—Track mileage decreased but there was an increase of 1.9 per cent in the number of passengers carried. Gross railway operating revenues amounted to $5,344,204 in 1922, an increase of 26.8 per cent as compared with 1917, but owing to a more rapid increase in operating expenses the net income from all sources shows a decrease of 1.6 per cent for the period.

	1922	1917	Per Cent of Increase, 1917-1922
Number of operating companies	5	6	......
Miles of single track†	238.79	244.89	*2.5
Number of cars, all types	546	526	3.8
Electric locomotives	4	2	......
Number of persons employed	1,699	1,845	*7.9
Salaries and wages	$2,409,829	$1,527,534	57.8
Primary horsepower, total	27,889	27,663	0.8
Kilowatt capacity of generators	2,375	20,475	*0.5
Current generated, kilowatt-hours	54,447,834	49,241,514	10.6
Current purchased, kilowatt-hours	6,767,096	3,341,588	102.5
Passengers carried	97,566,736	95,782,721	1.9
Revenue car mileage	13,980,336	14,018,246	*0.3
Railway operations, revenues	$5,344,214	$4,213,457	26.8
Railway operations, expenses	$3,804,379	$2,697,958	41.0
Net revenues, railway operations	$1,539,835	$1,515,499	1.6
Auxiliary operations, revenues	$643,890	$279,810	130.1
Auxiliary operations, expenses	$467,655	$215,738	116.8
Net revenues, auxiliary operations	$176,235	$64,072	175.1
Net operating revenues	$1,716,070	$1,579,571	8.6
Taxes assignable to operations	$537,180	$375,149	43.2
Operating income	$1,178,890	$1,204,422	*2.1
Non-operating incme	$44,162	$20,364	116.9
Gross income	$1,223,052	$1,224,786	*0.1
Deductions from gross income	$750,579	$754,015	0.7
Net income	$472,473	$479,771	*1.5

†Includes in 1922, 33.14 miles of track lying outside of the state but owned by companies within the state, and in 1917, 33.90 miles of such trackage.

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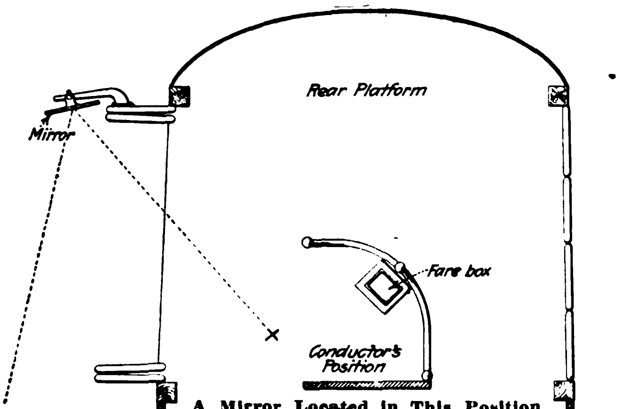
*Indicates decrease.

Conductor's Mirror Reveals Approaching Passengers

By Erwin C. Schroetter

NOWADAYS the rear platform of the ordinary electric railway car is equipped with folding doors. These doors are habitually closed before the car starts, the process being compulsory where doors and control are interlocked, and being required by rule in cases where the doors are not equipped with interlocking devices. The conductor, in collecting fares, usually faces toward the rear and cannot see passengers approaching alongside the car from the front. It frequently happens, therefore, that he closes the doors and gives the signal for the car to start just as a belated passenger reaches the rear entrance. In such cases, the passenger is usually left behind, nourishing a natural but unjust resentment against the railway and its representative on that particular car.



A Mirror Located in This Position Enables Conductor to See Along the Side of Car

To remedy this difficulty and enable the conductor without leaving his post to see a passenger approaching from the front a mirror may be installed on the rear leaf of the door as shown in the accompanying illustration. When the rear folding door is opened, the position of this mirror would be such that a single glance from the conductor would suffice to show him whether there was a passenger approaching from the front. The device is somewhat similar to that which has been successfully used at the front end of railway cars, to enable the motorman from his normal position to see what is happening at the rear end.

Seventy per Cent of Riders Have Exact Fare on Beaver Valley Line

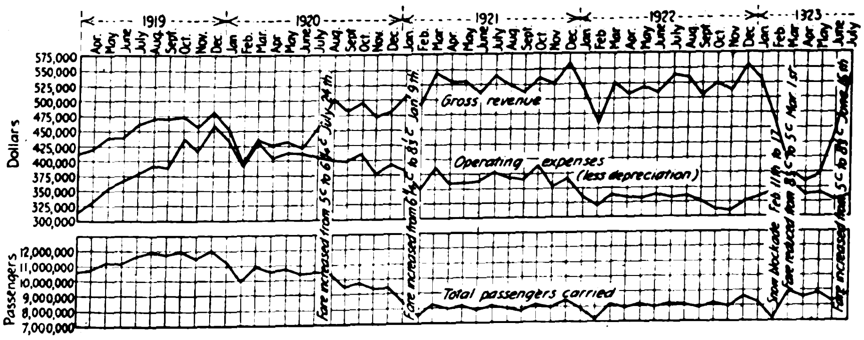
WITH a view to determining the percentage of persons who tender exact fare when boarding a car, the Beaver Valley Traction Company, New Brighton, Pa., recently made a check of the passengers boarding a car on the route operating from Rochester to Beaver Falls and for part of the day through Beaver Falls to Morado Park. The results show that on Sept. 18, on the car checked, 296 passengers presented passes, 1,096 paid cash fares and 120 transfers. Of the passengers tendering cash fare, it was necessary to make change for 445, or 40 per cent. Sixty per cent, or 651 passengers, paid fare with the exact change. If the number of those who presented the exact fare is combined with those who presented passes or transfers, it is found that 70½ per cent had the exact fare, while change had to be made for only 29½ per cent.

Effect of Fare Changes in Seattle on Passenger Traffic

THAT changes in the rate of fare do not reflect themselves immediately in passenger traffic on a street railway is shown by the experience in Seattle in the past five years. The accompanying chart shows the number of passengers carried, the gross revenue and the operating expenses from April, 1919, to July, 1923. Upon the commencement of municipal operation and until July 24, 1920, the fare was 5 cents. The number of passengers monthly in this period fluctuated between 10,000,000 and 12,000,000, the receipts being practically in proportion. On that date the fare was increased to 10 cents with four tickets for 25 cents. The number of riders did not decrease immediately, but there was a slight reduction up to December, 1920, when the monthly total had fallen to 9,424,000.

The cash fare remained the same through 1921, but on Jan. 9 of that year the ticket rate was increased to three for 25 cents. The chart shows that this caused a further decrease in the number of riders. The figure remained practically at 8,000,000 per month until February, 1923, when a snow blockade reduced the riding materially for a period of about six days.

Pursuant to a pre-election pledge, the Mayor obtained a reduction in fare to a flat 5 cents, effective March 1 of this year. The events leading up to this change were described in the ELECTRIC RAILWAY JOURNAL for Aug. 4, page 175. The increase in passenger traffic due to the 5-cent fare was not very large. In fact, the reduction in revenue was so great that pressure immediately was brought to bear on the city administration, and on June 16 the fare was increased to 10 cents cash, with an 8⅓-cent ticket rate, which had been in effect previous to the agitation for reduced fares. Operating results for June and July indicate that there has been virtually no reduction in riding due to this increase in fare, so that almost the entire value of the change in rate has been realized.



Operating Revenues, Expenses and Total Passengers, Seattle Municipal Railway, 1919 to 1923, Showing Effect of Various Changes in Rate of Fare

The chart of operating expenses shown beneath that for revenue indicates that while the costs fluctuate to a certain extent along with the revenues, this change is not nearly so great. In other words, the margin between receipts and expenses was practically wiped out during the period of the 5-cent fare.

Association News & Discussions

Public Security Issues in Better Demand*

Progress Being Made in Solving the Special Problems of the Electric Railway Companies

By Henry R. Hayes
Stone & Webster, Inc.

WE HAVE witnessed this year in the public utility business in this country a continuation of the great expansion which took place during the years of 1921 and 1922. To provide funds therefor, and for refunding purposes during this period of two and three-quarter years, it has required, in addition to the investment in property of large sums of undistributed earnings, the sale of upward of $2,500,000,000 of bonds, notes and stocks.

This large volume of financing, in itself one of the major items in the total of all financing for the period, could not have taken place unless the condition and general credit of the industry as a whole were fundamentally sound. In the opinion of the committee they have never been better, though the costs of capital (hereinafter discussed) are high.

Happily, in the interests of the industry and the public served, there is evident, to a marked degree, a steady broadening of the market for utility securities. It is noticeable in two ways—first, in an increased demand from institutions such as savings banks and insurance companies which gather in the small savings of the people, and secondly, in the last three years especially by sales of securities to the extent of many hundred millions of dollars direct by companies to the users of utility service. In the latter instance it has resulted in opening up an entirely new market for securities in small lots on a basis of reasonable costs. We believe this market has still greater possibilities of development. As has been pointed out to members of this association, all such efforts to sell securities which possess investment merit at prevailing market rates should be aided and encouraged by investment bankers. As the estimated annual budget of the industry requires for extensions, improvements, and refunding purposes over one billion dollars, no new possibilities for raising capital should be neglected.

The current year is one in which many state legislatures have been in session. There were more or less active efforts, in some cases political, in six states to break down state-wide regulation of utilities and to revert to the harmful method of local regulation by the municipalities (so-called "home rule"). Much time and attention has been required of your committee and several group legislative committees, but in every case "home rule" efforts were unsuccessful.

We are dealing with an industry intimately and inextricably bound up in the industrial and social life of the country. It represents a capitalization of close to $15,000,000,000. The industry is basic and essential to all the people. It is an industry, too, where the profits are now limited and can no longer be subjected to the evils of exorbitant profits too often prevalent in its early history. Viewed in this light, it might seem disturbing that there has existed so much talk and agitation this year for local regulation of utilities, especially in New York State, where there was much agitation for municipal ownership and operation.

Those investment bankers who are identified with the actual sale of public utility securities know full well how sensitive the minds of investors are to any tendency, economic or political, which will, or even might, adversely affect honest investment. Investors seem to possess that kind of instinct which can recognize agitation of a purely political character and are very much disposed to withhold funds from the business while such agitation exists. Continued withholding of funds cramps a utility and the public is eventually not adequately served. It is very unfortunate that voters in general, who naturally are themselves daily users of utility service, do not yet seem to have acquired any such discernment. It has become more evident than ever that a development of local sales of investment securities by operating companies direct to users of service will be helpful in preventing such unfair political attacks.

When administered with the broadest powers and in a judicial manner, state-wide regulation of public utilities has been conclusively proved, in the opinion of your committee, to afford the best guarantees which investors can have in this country for a maintenance of that integrity of investment necessary for a ready flow of money into the business (see annual report of 1922 committee).† Where such conditions do not exist we find lack of development of the business or higher costs of money or both—conditions which adversely affect the costs of service to the consumer.

A careful study made by your committee of the policies of the various states throughout the country in regulating the industry shows that as to privately owned plants, in the forty-eight states and the District of Columbia only twenty-five commissions have authority in matters of valuation, rates, services and capitalization. While about three-quarters of the states require of privately owned properties their financial reports of operation, and that such reports are open to public inspection, probably less than half of these reports are actually published. We believe that the public and investors are entitled to this information. Your committee does not believe the best operating results can be attained by the industry until the commissions have such broad authority, exercise it judiciously and regularly and publish full financial reports of operations. Furthermore, money cannot be steadily raised at reasonable costs until the country more fully attains this result.

Of those utilities which are municipally owned and operated, only ten state commissions have jurisdiction over rates, services and accounting. It seems essential that voters of communities which are in the utility business should be more actively educated to a point where public opinion will require proper accounting and sound methods of engineering, finance and operation.

ELECTRIC RAILWAYS

Your committee believes that electric railway service is essential to community service, especially for heavy traffic. The field is developing for trackless trolleys and buses, but such transportation should be supplemental to the main system of transportation. While this newer development in transportation has taken place comparatively recently, it is interesting to note that eighteen state commissions already have jurisdiction over "auto buses" and more with partial and limited jurisdiction. This kind of legislation should be encouraged.

The problems of the electric street railways today are those largely incidental to more economical operation and the prevention of unfair competition. Much progress has been made in the solution of both.

The interurban roads are especially hampered by competition on the highways from trucks and buses which do not pay a fair proportion of the tax burdens. The problem of expense of maintenance of the highways alone, aside from the unfairness of the competition for freight and passenger traffic, is serious and perhaps national in scope.

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*Abstract of a report made to the Investment Bankers' Association of America by Mr. Hayes as chairman of its committee on public service securities. Presented at the annual meeting, Washington, D. C., Oct. 29-31, 1923.

†See ELECTRIC RAILWAY JOURNAL, Oct. 14. 1922, page 639.

An instance of unfair competition is the Chicago, Aurora & Elgin Railroad-Smith Bus Line, Inc., case. The Illinois Commission granted a certificate of convenience and necessity to the bus line. An appeal to the order of the commission was confirmed by the Circuit Court. The case on appeal was taken to the Supreme Court, which reversed the decision of the lower court and set aside the order of the state commission. The following is quoted from the decision of the Supreme Court of the State of Illinois: (Joseph K. Choate, Receiver, et al., Appellants, vs. Illinois Commerce Commission, Appellee — April, 1923.)

> The railroad company has assets valued at approximately $15,000,000 and a gross operating revenue of substantially $1,250,000 a year. Notwithstanding the fact that the railroad company operates through an unusually rich, heavily populated section, it is temporarily in the hands of a receiver. The total assets of the Smith Bus Line are three buses purchased in the summer of 1920 at a total cost of about $10,000. It is safe to say that they are now worth less than one-third of that amount. The commission recognized the financial irresponsibility of the bus line and directed it to provide liability insurance to the amount of $10,000 for each bus. Passengers in a bus loaded 50 per cent beyond its capacity now have for their protection the privilege of trying to collect $10,000 from an insurance company. The public has nothing to assure them that the bus line will operate on regular schedule, and it requires no argument to demonstrate that it is incapable of furnishing adequate service to the inhabitants of the two smallest villages in the valley, much less to the 100,000 people living in and between Aurora and Elgin. One accident resulting in a serious injury or death of one person would be enough to wipe out the entire assets of the bus line. If one of the buses were taken out of service the bus line's ability to serve the public would be lessened one-third, and with three buses out of service the public would have no accommodation at all. The financial statement of the bus line shows that it is wholly incapable of supplying additional facilities, whereas the receiver for the traction line is financially able to provide additional equipment, if the transportation needs of the territory demand it. The plan of the bus line is to start from the railroad terminals a few minutes ahead of the cars and to secure what business it can without making an effort to provide adequate service for the territory through which it operates.
>
> The railroads in this country have kept pace with the industrial development and the population increase, and the prosperity of the nation has been due to a large extent to the steady expansion of the transportation system. The savings of hundreds of thousands of investors have been massed to build our great network of railroads, and these transportation systems are entitled to protection from irresponsible competition. If shoestring transportation companies, with no money invested in right of way and no reserve capital to provide adequate service or to protect the public from damage, are permitted to drop in here and there and take the cream of the transportation business from the permanent transportation systems, disastrous results are inevitable. If the permanent highways built at the expense of the people are destroyed, these irresponsible bus lines, that profess to serve the public convenience and to supply public necessity, will leave the public to walk or to provide other transportation facilities. Orders of the public authorities to furnish adequate transportation facilities would be unavailing, because the bus lines would be wholly incapable of complying with the order.
>
> The statute provides the means for compelling the existing transportation system to provide adequate service for the public. If the people living in the territory through which the Aurora, Elgin & Chicago Railroad operates are not being properly served they can file a complaint with the Commerce Commission, which has the power to order whatever change or increase in service the evidence warrants. If the existing transportation company does not comply with the commission's order, then a situation may arise where the public convenience and necessity will require the establishment of another system. The theory of the public utilities act is to provide the public with efficient service at a reasonable rate by compelling an established carrier occupying a given field to provide adequate service and at the same time to protect the existing utility from ruinous competition. (West Suburban Transportation Company vs. Chicago & West Towns Railways, No. 15273.) By this method the public is protected from paying the cost of the operation of competing systems and a return upon a double investment of capital. No doubt the proposed bus line would accommodate a few individuals in the Fox River Valley, but the convenience and necessity which the law requires to support the commission's order is the convenience and necessity of the public as distinguished from that of an individual or any number of individuals. There is some evidence in this record which, if it stood uncontradicted, would support the order of the commission, but the evidence taken as a whole overwhelmingly preponderates against the order. Where it is found that the order of the commission is without substantial foundation in the evidence it is the duty of the courts to set it aside. (Commerce Commission vs. Cleveland, Cincinnati, Chicago & St. Louis Railway, No. 15389.)
>
> The Circuit Court erred in confirming the order of the Commerce Commission. Its judgment is therefore reversed and the order of the commission is set aside.

DISCLOSURE OF INFORMATION

Your committee is pursuing the studies initiated by the 1922 committee with reference to financial information contained in offering circulars as well as in data released by public utility companies. The fact that adequate financial information to some degree at least is not yet being released creates a condition detrimental to the business. We believe that investors should have complete information and that the public is entitled to know what the industry is doing financially. Until these results are accomplished, your committee does not feel that public utility credit will gain that high standing which it has rightly earned.

There exists little difficulty in getting the necessary information as to the steam railroads or the telephone business. Why should there be difficulty with respect to the public utility business, i.e., the gas, electric light, power and electric railways, devoted likewise to the service of the public interests.

Central Electric Traffic Association to Meet Nov. 21

THE next regular meeting of the Central Electric Traffic Association will be held at the Hollenden Hotel, Cleveland, Nov. 21 and 22.

The opening session, called at 10 a.m., will be in the nature of a round-table discussion. At this session all matters of interest to the electric railways, particularly those affecting the various committees of the Traffic Association, should be brought up for discussion. The afternoon session will be devoted to the meetings of the various committees.

The morning session of Nov. 22 will be devoted to reports of committees and such other business as may properly be presented.

A meeting of the chairmen of all standing committees will be held at 2 p.m., Nov. 21, to outline the program and arrange for the necessary committees to conduct the work of the Traffic Association for the year 1924.

Federated Engineering Societies Studying Coal Storage

RESULTS of far-reaching economic and social importance are likely to be attained by the nation-wide study of the storage of coal now in progress by nearly 100 committees of the Federated American Engineering Societies, it is disclosed in a progress report by Dean F. Walker of the University of Kansas, who is directing the field work of the investigations. He said that the final report would be ready about Jan. 1, 1924, and would place at the disposal of the nation the most authoritative information obtainable as to the engineering, chemical and economic factors involved in the storage of coal.

More than 500 engineers are actively engaged in making the study under the direction of a main committee, headed by W. L. Abbott of Chicago. These engineers have found, it was reported to the executive board, that it is necessary to conduct separate investigations to meet peculiar local conditions which are found in various cities and districts.

The executive board authorized the appointment of a special committee to study the report of the United States Coal Commission with the object of ascertaining what engineering conclusions of the commission the Federated American Engineering Societies might adopt.

Executive Secretary L. W. Wallace of the federation, in a report to the board, deals with substitutes for anthracite, saying:

"Upon the eve of the threatened coal strike, F. R. Wadleigh, Federal Fuel Distributor, made an official and formal request that the Federated American Engineering Societies assist the Federal government in its proposed plan of informing the public as to what substitutes could be used, where to secure them and how to utilize them.

"Plans were about perfected whereby the Federated American Engineering Societies could effectively co-operate with Federal and state officials when the strike which made it so immediately necessary to proceed was settled.

"Although the strike is over, yet there is the necessity for such procedure, as anthracite is becoming harder to secure and the cost is steadily increasing. Therefore, it is deemed advisable for the Federated American Engineering Societies to give careful consideration to encouraging such a campaign of education."

Arkansas Utilities Association

THE dates for the convention of the Arkansas Utilities Association have been changed to Thursday and Friday, Nov. 15 and 16.

Maintenance of Equipment

Inspection with Watt-Hour Meters

By O. A. Norene
Assistant Master Mechanic Omaha & Council Bluffs Street Railway

SYSTEMATIC inspection is important in the care of equipment. At the present time we use two forms of inspection in Omaha—one on the kilowatt-hour basis and the other on the seven-day basis. The kilowatt-hour basis of inspection has proved the most satisfactory. At present only about 50 per cent of our cars are equipped with economy meters; however, the balance of the cars will be equipped in a very short time. These meters are equipped with three inspection dials, "A," "B" and "C," which determine when the car should be held in for inspection.

What we term the "A" or light inspection is made after the car has made approximately 800 car-miles, as calculated from the meter reading. At this time brakes, emergency control, and equipment and motors are inspected and oiled.

The "B" or general inspection at the carhouses includes all of the fifty-three items enumerated on an inspection card. This is made when a car has made approximately 2,400 car-miles, or about once every seven days.

Small cards are furnished for the use of the inspectors, on which the different parts of equipment are enumerated. Each part is checked off, dated and initialed by the man when the inspection is made. Two cards are made out, one of which is retained by the carhouse foreman, while the other is sent to the master mechanic's office. Here a large card is kept, on which the different inspections and car failures are checked off for a whole month. If a car is pulled in between inspection periods for any defect, or for faulty or careless inspection, it can easily be traced to the right man. It is a probability that the period between the two "A" and "B" inspections can be increased materially in the near future.

The "C" inspection, or general overhaul, is made at the general repair shops after the car has made about 50,000 car-miles. Trucks and electrical equipment are then removed and overhauled and the car body is placed in the paint shop, where it is repainted or revarnished as the need may be.

Tie Bar Reduces Work of Track Construction

A Labor-Saving Device Used to Support the Tie While It Is Being Spiked to a Suspended Girder Rail

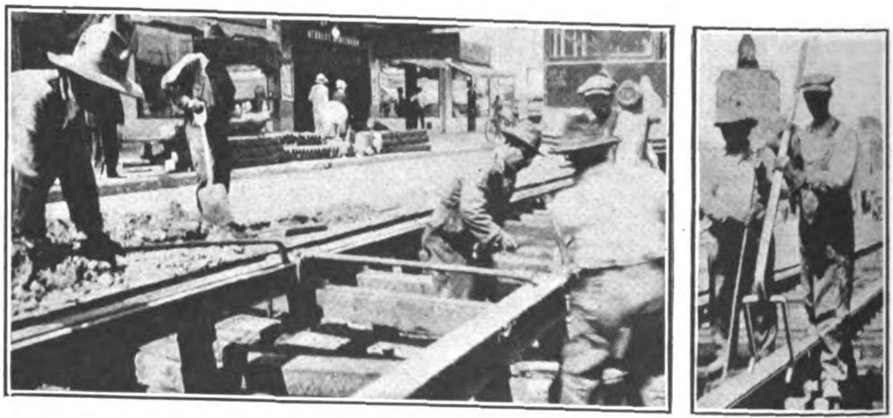
By Clifford A. Elliott
Engineering Department Pacific Electric Railway, Los Angeles, Cal.

WHERE a 7-in. 128-lb. grooved girder rail is used in reconstructing tracks in paved streets, the Pacific Electric Railway uses a trench 21 in. deep. When this reconstruction work is carried out under service conditions, the track is usually "cribbed up" while the excavation work is taking place. In this work every fourth tie is left in place under the rail until the 21-in. trench is completed, when full tieing of the tracks takes place. The placing and spiking of the permanent ties formerly required six laborers. Four of these, each with a tamping bar, held the tie in position at the ends, while the other two laborers spiked it in place.

A tie bar has now been designed which enables the work to be performed by four men. The accompanying illustrations show the method of using this tie bar.

The bar is made up of two pieces of steel, ½ in. x 1 in. by approximately 8 ft. long. These are riveted together with countersunk head rivets for a length of 6 ft. to form the handle of the tie bar. At the toe, the bar is bent to give a convenient form when used as a fulcrum, and the two steel bars are spread apart so as to give a head fork width of 6 in. The cross-section is extended downward 18 in. and the ends are then bent outward for an additional length of 6 in. These latter projections act as peavies for holding the tie in position.

In using this bar the laborer puts the fork over the rail and pushes the toes under the tie, then by pressing down on the handle the tie is raised into position and is firmly held for spiking.



At Left, Holding a Tie in Position for Spiking. At Right, Form of Tie Bar Used by Pacific Electric Railway

Replacing 9-In. Rail by 7-In. Rail Shimmed Up

HIGH cost of maintenance recently caused the Kansas City Railways to replace track on Walnut Street between Eighth and Twelfth Streets. This piece of track had been reconstructed several years ago, using old rail which after further wear had broken in many places. This short stretch required the attention of a gang of six or eight men almost constantly, replacing broken joints and broken rail. In the former reconstruction, this track had been placed in solid concrete on creosoted ties. All this base was in first-class condition, but the replacing of the 9-in. rail with the 7-in.

rail involved some complications. There was not room to place steel ties except by removing a large amount of concrete. The problem was solved, however, by placing upon each of the old wooden ties a 2-in. shim, and incasing all, including the base of the rail, in rich concrete.

New Equipment Available

New Model 16-In. Lathe

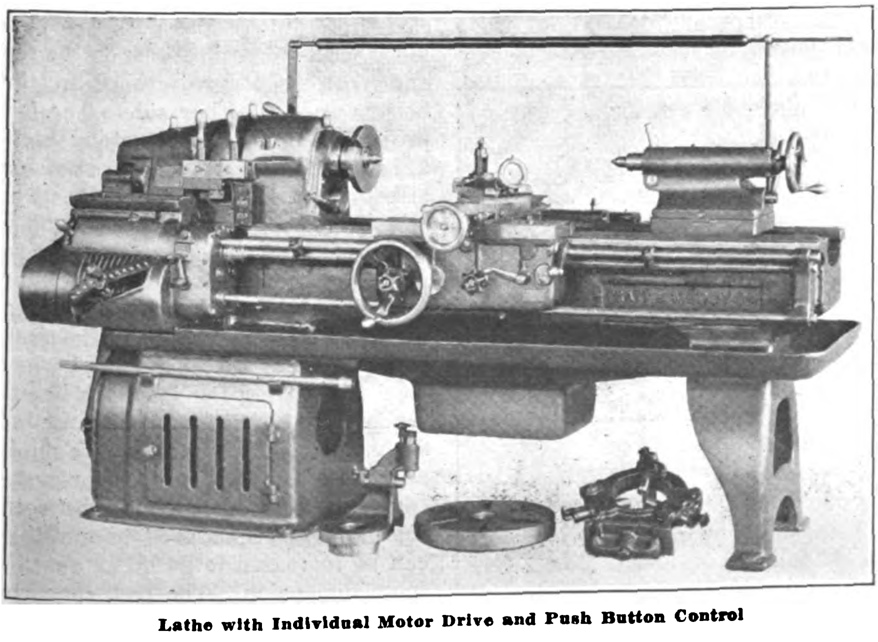
A LATHE with general head for drive by independent motor, single pulley or with cone pulley head has been brought out by the Pratt & Whitney Company, Hartford, Conn. This is a 16-in. lathe known as model B and is suitable for either tool room or high-speed work.

A compact headstock has been developed for both the geared and cone-head types. By mounting the back gears below the spindle, overhanging parts are eliminated, the headstock is centered over the bed and the operator is given greater freedom of movement. The back gears can be engaged from the front of the machine by means of an eccentric lever located under the spindle nose.

The individual motor drive is equipped with push-button control located conveniently on the front of the headstock. The motor is mounted within the cabinet leg and connects by belt to the main drive pulley. For single pulley the drive is through a guarded pulley at the rear. The cone head has a solid housing and side gears. A hand brake adds to the safety and speed of operation.

The positions of the ratio lever and rocker arm for any desired feed or thread are instantly located by a large, direct-reading index plate mounted on the quick-change gear box. This device permits rapid setting and checking of the feed in use and makes the gear box foolproof. A smooth, quiet drive to the feed gearing is secured by the use of large spur gears.

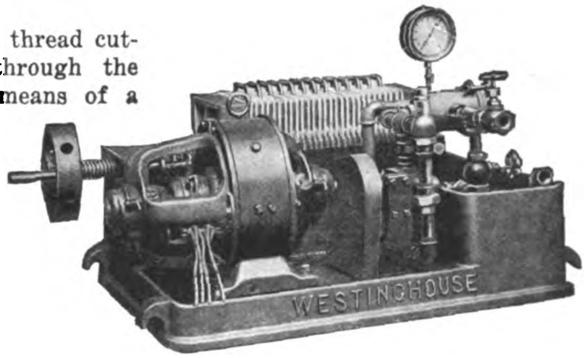
Quick withdrawal for thread cutting is accomplished through the regular handwheel by means of a coarse-threaded sleeve on its hub, making it a one-hand operation. A positive stop on the sleeve acting against a similar stop on the carriage does away with any strain on the cross-slide. The lever operating the combined stop and reverse rod is located at the right end of the apron. This is above the lead screw and permits the operator to set the carriage stop without stooping or taking his eyes from the work. The tailstock has a long, solid barrel and a large graduated spindle. This spindle is locked by a long wedge on its lower side in such a way that no loss of accuracy can occur from the locking strain. The tailstock is clamped to the bed by an eccentric shaft parallel to the spindle, and the same handle provides a means of moving the tailstock along the bed. The usual type of carriage cross adjustment is provided.



Lathe with Individual Motor Drive and Push Button Control

Oil Drying and Purifying Outfits

IN ORDER to make it possible for central stations and other large users of transformers, oil circuit breakers, electrolytic lightning arresters and feeder voltage regulators successfully to dehydrate and purify oil with a minimum of expense, the Westinghouse Electric & Manufacturing Company has developed a special type of filtering outfit.

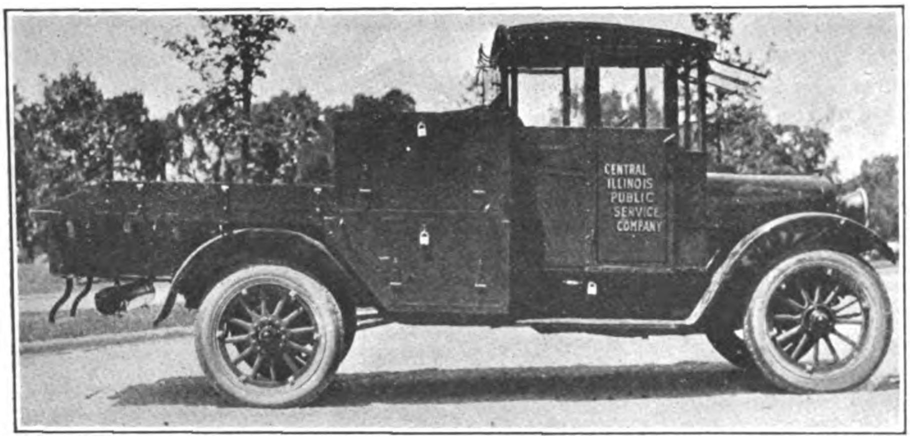


10 Gal. Oil Drying and Purifying Outfit

The outfits are made in five standard sizes, divided into two classes according to the size of the filter paper. The three larger sizes are rated at 10, 20 and 30 gal. per minute and the two smaller sizes at 2½ and 5 gal. per minute. A complete outfit consists of a filter press, motor, pump, oil strainer, pressure gage and piping. The sizes up to and including 10 gal. per minute are mounted on an iron base cast with a high rim that forms an enclosure and serves as a drip pan. The 20 and 30 gal. sizes are mounted on a structural iron base and have a sheet metal drip pan.

The filter press proper is made up of a series of flat cast-iron plates and frames assembled alternately with filter papers between them. By means of a screw and lever and a movable cast-iron end block the plates, frames and papers are forced tightly together. The plates and frames are cast with holes in two of the corners. When the plates and frames, with the filter papers between them, are assembled, the holes form the inlet and outlet for the oil.

The filter paper used is a special grade of white blotting paper about



New Line Truck of Central Illinois Public Service Company

0.025 in. thick. It is prepared from wood pulp and contains no coloring matter or chemicals that might injure the oil. Five sheets, cut to the proper size with holes punched to correspond with the holes in the filter plates and frames, are used between each plate and the adjacent frame.

To obtain the best results in treating the oil it is absolutely necessary that the filter paper when first placed in the filter press be entirely free from moisture. Since filter paper will invariably absorb moisture if exposed to the air for any length of time and must, therefore, be thoroughly dried under heat before it is used, specially constructed drying ovens have been designed for this purpose.

Large Fleet of Line Trucks Used in Illinois

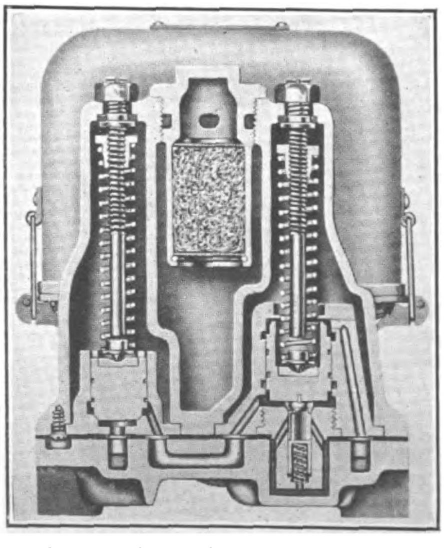
FIVE new line trucks have recently been added to the fleet of speed wagons used by the Central Illinois Public Service Company, making a total of twenty-four trucks of this type now in use. This company operates the Central Illinois Traction Company, the Southern Illinois Railway & Power Company and gives local service in several other localities.

The type of trucks as shown in the accompanying illustration has built-in boxes, racks and receptacles for the various tools needed in line repair work. Wooden tool boxes are located at the rear of the cab, and in addition steel tool boxes are placed on the running board below the cab on either side. A galvanized steel receptacle at the rear of the body is used for carrying rubber blankets. At the left of this compartment is another for carrying live line tools. This is 10½ ft. long and extends under the seat. Another small rectangular compartment beside this is used for carrying pike poles. This also extends under the front seat. A compartment at the right hand side is used for shovels, digging bars, and other miscellaneous large tools. In maintaining the various lines, the trucks are located in districts and take care of the maintenance of overhead lines, transmission, and distribution systems, of which there is about 1,600 miles, giving service to 205 towns in Illinois.

New Type of Governor

A NEW governor for motor-driven air compressors is being placed on the market by the Westinghouse Traction Brake Company, Wilmerding, Pa. This has been designated type S-16 and distinctive features include a reduction in size, weight and cost, as well as improvements in design of detail parts over the well-known double safety valve type of governor.

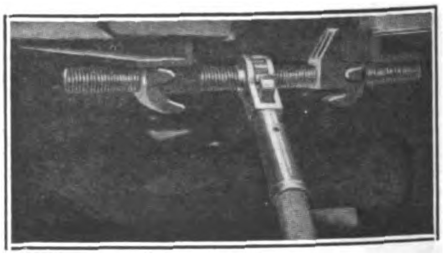
The contact fingers are self-contained and incased in molded insulation, so that they can be readily removed as units without special tools. The finger adjustment is permanent, so that there are no screws which may loosen in service. An efficient pneumatic blowout is provided. When the governor cuts out, this, in combination with the peculiar shape of the contacts, insures that the opening arc is lengthened and cooled, so as to extinguish it effectively. Air from the main reservoir line is vented from the switch cylinder into the switch governor whenever the governor cuts in. This aids in discharging copper gases. A self-contained cartridge type of hair strainer is used to protect all parts. Pipe connections are made in a separate base so that no pipe connections need be broken in order to remove the operating parts. Pressure adjustment is made by loosening a locknut with a wrench and using a screwdriver on the high and low-pressure adjusting stems. Both high and low-pressure valves have metal seats.



Construction of New Type Governor

Handy Type Push and Pull Jack

A HANDY tool for wrecking operations as well as one for which many uses can be found in electric railway shops is the new push and pull jack being marketed by the Duff Manufacturing Company, Pittsburgh, Pa. The design of this jack is extremely simple, consisting of a steel screw, ratchet with pawl, and two cast steel nuts. The nuts are provided with flat projections on the top and with hook projections on the bottom and on either side. The flat projection is used for pushing operations, while the hooks are used for attaching tackle for pulling.



Jack Applied for Spreading Operations

By the use of chains and hooks, fastened to the nuts, the jack can be used for retracking cars or for straightening bent portions where a direct pull is necessary. The jack has a capacity of 10 tons and when used for pulling the jaws can be extended to a maximum distance of 25 in.; this can be reduced to a minimum of 9½ in. When used for pushing the minimum distance between the flat projections is 8½ in. and this can be increased to 24 in. as a maximum dimension. The jack complete weighs 39 lb.

The News of the Industry

Votes for Franchise

Baton Rouge Electric Company Given Fifty-Year Grants—New Lines to Extend to Suburbs

The taxpayers of Baton Rouge, at a recent election, voted affirmatively on a city ordinance for a fifty-year franchise to the Baton Rouge Electric Company for a railway line to the suburbs, north of the city, where the works of the Standard Oil Company are located. An affirmative vote was also given the Baton Rouge Electric Company for an extension of the franchise on its belt line, thus making both franchises effective for fifty years.

The Baton Rouge Electric Company realized that another line was needed to bring the service up to date and to meet the growing wants of the city, and expressed itself as ready and willing to undertake the work of improvement as soon as it was authorized to do so. The extensions and additions contemplated under the ordinance are said to involve the expenditure of about $300,000.

Under the provisions of the franchise it is stipulated that the motive power for the cars shall be electric; that the fare for one continuous trip on any line covered by the franchise shall not be more than 5 cents unless ordered changed by the Commission Council of Baton Rouge, the Louisiana Public Service Commission, or any other legally constituted authority. In addition free transfers are to be issued.

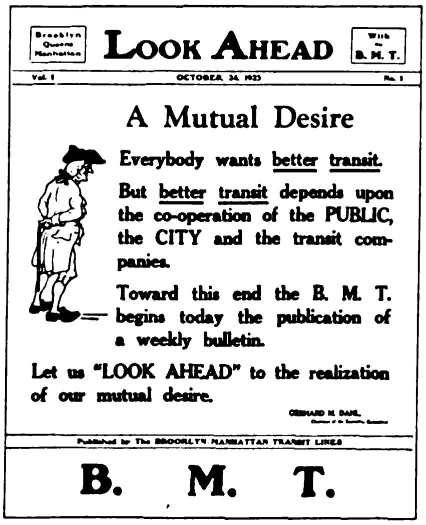
It is stipulated that within thirty days after the granting of the franchise and right of way the Baton Rouge Electric Company shall file with the city auditor its acceptance and shall furnish a certified check in the sum of $5,000 that it will construct and put in operation the said Dixie extension over the streets within two years from the date of grant and acceptance.

It is agreed that the company shall not sell or lease its privileges to any railroad operated by steam coming into the city of Baton Rouge. A provision allows for the free transportation of the police of the city when on duty and in uniform or with badge, firemen and other city employees. The franchise states that a failure to operate the road for thirty consecutive days without cause or the consent of the Commission Council shall operate as a forfeiture of the franchise, the failure to be determined and forfeiture decreed and enforced by any court of competent jurisdiction. A provision is also made that children attending schools in the city shall be furnished transportation at a price not exceeding three-fifths of the regular fare, provided that each child shall have the right to such reduced fare only when going and returning from school.

Improved Platforms for Golden Rod Yellow Cars

The Interborough Rapid Transit Company, New York, N. Y., gave a demonstration run with four reconstructed cars on its Second Avenue Elevated line Nov. 7. The principal improvements in these cars consist of vestibuling the platform and providing sliding doors to replace the old swinging gates. The new platform arrangement will protect passengers against stormy and unpleasant weather conditions and also decrease the length of time required for station stops during heavy traveling periods. The new doors are electro-pneumatically operated and the door control is so arranged that one man can operate the doors on several cars. This system is similar to that already in use on Interborough subway trains. The run was witnessed by Transit Commission representatives and Interborough officials.

"A Mutual Desire"



Brooklyn
Queens
Manhattan

LOOK AHEAD

With
the
B. M. T.

Vol. I OCTOBER 24, 1923 No. 1

A Mutual Desire

Everybody wants better transit.

But better transit depends upon the co-operation of the PUBLIC, the CITY and the transit companies.

Toward this end the B. M. T. begins today the publication of a weekly bulletin.

Let us "LOOK AHEAD" to the realization of our mutual desire.

GERHARD M. DAHL

Published by The BROOKLYN MANHATTAN TRANSIT LINES

B. M. T.

In the hope of giving better transit with the co-operation of the public, the city and the transit companies the Brooklyn-Manhattan Transit Corporation has started the publication of a series of weekly bulletins named "Look Ahead." The first of the series was posted in 2,500 cars of the surface line and of the rapid transit lines in Brooklyn, Queens and Manhattan on Oct. 26. The company aims to make this publication a connecting link of information between the traveling public and the companies. The first message is reproduced herewith.

Arguments Advanced

Supreme Court at Columbia Hears Failings of City of Spartanburg and Its Railway Property

Another act in the drama of the controversy in Spartanburg was acted on Oct. 8, when the Supreme Court held a hearing in Columbia on the petition of the city to make the South Carolina Gas & Electric Company renew operation of its cars or forfeit its franchise.

The argument for the city, which was presented by C. E. Daniel, stressed the original contract existing between the city of Spartanburg and the South Carolina Gas & Electric Company. It was his contention that the commission had no authority to order cars in the city abadoned.

Henry M. Earle, general counsel for the local traction company, took the stand that the commission was guided by principles of common sense and justice, when it ordered abandoned the operation of an unprofitable railway. He said further that the city had been given better transportation than it ever had, and that if the franchise were forfeited, the city would have no street railway at all, because no individual or company would accept a franchise in view of the loss it imposes and of the attitude of the city administration toward this business proposition. He said that the fact was overlooked by the relators that Spartanburg had, for more than twenty years, the benefit of the services of a utility company built entirely at the expense of outside capital, and that the right of the investors to be protected against the alleged forfeiture had also received little consideration. Further, that the injury the public would receive through the crippling of the utility had also been overlooked.

He referred to the unreasonableness of the city in demanding transportation which was now out of date. He said that the abandonment by the public of the mule cars in 1899 and of the electric cars in 1920 was the natural result of progress and development, and that an established utility should not be required to forfeit its right to exist as an alternative to incurring the loss consequent to such natural changes.

In conclusion, he stated that the relators might, for reasons of their own, attempt to take advantage of the company's position brought about by the changed conditions, but that the commission had been created and organized for the purpose of protecting the rights of the State of South Carolina in its public utilities, and that it had seen fit to stop the confiscation and forfeiture and to protect alike the public utility company and the investors through considerations that were ignored by the City Commissioners. He said that the company had not declined to furnish service, that the public was not "irreparably" or otherwise "injured" and that adequate service was being and will be afforded under the direction of the commission, which had full authority and jurisdiction.

It will be recalled that cars in the city of Spartanburg were ordered abandoned July 21, through an order from the South Carolina Railroad Commission. Following the actual stopping of the cars, the company maintained the regular schedule on the interurban lines from the city limits on the western side of the city to Saxon mills and on the eastern limits to Clifton and Glendale Mill villages. The various steps in the controversy have been followed from time to time in these columns.

In the meantime the company is operating buses in the city of Spartanburg proper, which are giving satisfaction to the patrons, and the company, at the same time, is continuing the electric railway service on the suburban line, which runs about 10 miles beyond the city limits. Since Oct. 8 no step has been taken by the court, and undoubtedly some time will elapse before a decision will be rendered.

Following the hearing, the city on Oct. 20 filed an additional argument which quotes at length from the decision rendered by the court in connection with the New Jersey traction difficulty.

Chamber of Commerce Boosts Company's Position in Richmond

The Chamber of Commerce of Richmond, Va., recently adopted the following resolutions:

> Whereas the Virginia Railway & Power Company, inspired by an abiding faith in the fairness of the people of Richmond, has lately expended and authorized to be spent large sums of money in order to secure the adequacy of its service to the public and make its proper contribution to the general prosperity and growth of the city, and
>
> Whereas this substantial expression of good faith has stabilized and improved business conditions; therefore, be it
>
> Resolved, That the Chamber of Commerce of the city of Richmond, Va., urge upon its members and other civic bodies, and the public in general, a united effort to secure for the company through the City Council such revision of its franchise obligations as will insure a fair and equitable franchise and establish for the company a credit base to enable it to provide adequate, satisfactory service to the public.

The company is fighting for a recognized valuation for rate-making purposes in Norfolk at the present time and better conditions in Portsmouth, which will appeal to the public lender and increase the stability of the company's stocks and bonds. The same is true in Richmond, where officials are unable to carry out improvement programs because the city has not passed on its application for a blanket franchise to cover a number of old existing franchises which have begun to expire.

In a new statement, printed in *Public Service News*, the Richmond bulletin of the company for car distribution, now current, the company says, in commenting on its expenditures, that public utilities must always be in a position of inviting new capital, and that new capital is attracted only by prosperity on a sound economic financial basis.

Denies Commission Jurisdiction to Order Extensions in Los Angeles

A ruling of the State Supreme Court of California revealed on Oct. 31 that the writ of mandate sought by the Hollywood Board of Trade to compel the State Railroad Commission to assume jurisdiction of and to hear and determine a complaint against the Los Angeles Railway Corporation, which the Hollywood Board of Trade had filed with the commission, was denied.

Since 1918 the Hollywood Board of Trade has vigorously sought the right to place the power with some municipal or state board or commission to force the Los Angeles Railway Corporation to extend its lines into the Hollywood district of the city of Los Angeles. At various hearings the California State Railroad Commission has taken the stand that it did not have the power to order the extensions as the Hollywood district was already adequately served by the local lines of the Pacific Electric System, and it was the opinion that the line extensions would produce duplicate service in territory already supplied with car service. Also, in the particular territory into which extensions were sought the present fare of the serving line was 10 cents. It was the issue of the Hollywood Board of Trade that the extension of the other line would produce a 5-cent fare.

The Los Angeles Board of Public Utilities took the stand that it could not comply with the Board of Trade's petition and order the extensions, as the City Attorney of Los Angeles ruled that under the terms of the city's charter the Board of Public Utilities did not have authority to issue such an order.

It was suggested to the Board of Trade of Hollywood that it file a suit to determine who had jurisdiction.

After the Board of Trade had filed its original petition to the commission to order the line extensions, the commission saw fit to dismiss the application at a hearing held in Los Angeles, as the Board of Trade failed to present sufficient evidence to support its application that the ordering of such line extensions by the commission into Hollywood would be to the advantage of all parties and the public in general provided the question was determined by the courts prior to an exhaustive hearing on the merits of the case.

The court held that the question was a municipal matter and that the public utilities act, in so far as it seeks to confer jurisdiction upon the State Railroad Commission to order a street railway to extend its lines into a new territory in which it has no franchise, is ineffective for that purpose and to that extent void.

Tax and Free Transportation Are Heavy Burdens

The City Council of Seattle, Wash., recently referred to the franchise committee a petition of the privately owned Seattle & Rainier Valley Railway asking relief from its franchise requirements that it pay the city a gross revenue tax of 3 per cent, and also give policemen, firemen and other city officials free transportation. The petition recites that the company is unable to earn dividends on all its stocks, but nevertheless has removed the disparity in fares between the Rainier Valley line and the Seattle Municipal Railway by eliminating the transfer charges and by selling school tokens twelve for 25 cents. The company will be unable to continue these concessions if the tax and free transportation requirements are continued, the petition avers. The Rainier Valley company also asked repeal of an ordinance requiring the company to pave a portion of its right of way in Rainier Avenue between Morgan Street and Graham Street, asserting the work was unnecessary, and that the cost, $39,600, including replacements of tracks, would be a heavy strain on the company's finances.

Partial Service Resumed in Saginaw

Partial resumption of street car service with the motor bus as an auxilary has taken place in Saginaw, and within the next ten days, according to present plans of the officers, the entire Saginaw Transit Company will be in operation.

Service was started on Nov. 1 as an aid to the merchants who observed the annual fall Dollar Day, which a majority admitted was the largest since Dollar Day was begun several years ago, and most of them asserted that the improved city transportation service had a great deal to do with the success of the merchandising event.

The company was not ready to commence operations, but it was decided to start two complete car lines and three motor bus routes to aid the jitneys that have been serving the city since the suspension of street car service on Aug. 10, 1921.

Just as rapidly as track and overhead repairs are made additional cars will be placed on the lines, Charles S. Kressler, general manager of the company, says. Special crossings, diamonds and switches that have delayed work have been received and are now being installed. Although the jitney buses are giving the company competition, this will not be for long, as their licenses expire Nov. 30, and in the meantime the City Council will pass necessary legislation to prevent all competition with the car company.

Mr. Kressler has started advocating the best patronage for the car lines. His opening campaign launched with the merchants of the city whom he addressed was referred to in detail in the Oct. 27 issue of the ELECTRIC RAILWAY JOURNAL.

Governor Smith Optimistic

More Republicans in Assembly, but New York's Democratic Governor Is Hopeful About Traction Program

In spite of the personal appeal of Governor Smith to the voters of the state of New York to give him a Democratic lower house in the Legislature, the people up-state did not enthuse in support of the proposed public utility control and hydro-electric development legislation. As a result of the election on Nov. 6 the Assembly is Republican by an increased majority.

It is anticipated, however, that the Republicans will propose compromise legislation dealing with public utility regulation and power development. The most that can be expected, however, is some attempt to solve the New York City traction muddle, and that some effort will be made in this direction by the Republican Assembly leaders seems certain with a Gubernatorial and Presidential campaign coming on next year.

Under the Hearst-Hylan plan defeated in the Legislature this year, the functions of the Transit Commission, with jurisdiction in New York City, would have been transferred to the Board of Estimate and Apportionment of New York City. Among the objections raised by the Republicans was that the program advanced by the Democrats did not insure the permanency of the 5-cent fare and did not require municipally operated lines to be self-sustaining, but that it left the Board of Estimate the power to increase rates and provided for the concealment of losses and merging into the tax rate.

The Republicans also opposed the appropriation by the city for bus lines.

NEW PLAN FOR TRANSIT COMMISSION

It is said that Governor Smith has a plan under consideration calling for the elimination of the Transit Commission appointed by Governor Miller, but which will recognize the principle of state regulation of transit lines. All functions now performed by the Transit Commission in connection with the planning and construction of new transit lines would be recognized as city functions and shifted to the Board of Estimate or some agency created by the city for the purpose of taking over this work. It is said that Governor Smith will submit a transit proposal which in the main will follow the lines suggested by the Republicans in the Assembly at the conferences with Governor Smith in the closing weeks of last year's Legislature.

What the Governor regards as a necessary prerequisite for the solution of the traction difficulty is to break the deadlock between state authority and city authority. It is said that a compromise is now possible, for while the Republicans with their majority in the Assembly would have the power to prevent abolition of the Transit Commission, Democratic leaders can't see any reason why they should want to exercise that power as long as this contention for the principle of State supervision is not disregarded.

News Notes

Propose Thirty-eight per Cent Increase.—Proposals of the employees of the Worcester Consolidated and Springfield Street Railway Companies in connection with a contract to replace that which expires Dec. 31 call for an eight-hour day, a maximum of 80 cents an hour for regular blue uniform men, 95 cents an hour for one-man car operators and a 30 per cent increase of pay for miscellaneous employees. As computed by the company officials, the employees' proposals call for an increase of 38 per cent over the existing rates, figured on the hourly basis, or 22 per cent when figured by the day, plus the reduction of the workday from nine to eight hours. In the case of one-man car operators it is figured that the increase would be 44 per cent, on the hourly basis. The increased wage for platform men would be $5.60 minimum to $6.40 maximum, per day of eight hours, and $7.60 for one-man car operators. The companies propose 58 cents an hour as the maximum, as at present, with an additional 5 cents an hour for one-man car operators, and elimination of certain bonuses. The first conferences took place on Nov. 5.

Comments on Power Situation.—Alexander MacKenzie, president of the Brazilian Traction, Light & Power Company, was among the arrivals on the *S.S. American Legion* of the Munson Steamship Line in New York recently. Sir Alexander reported that his company, which furnishes all the traction, light and telephone service to Rio de Janeiro and São Paulo, Brazil, is completing a new 160,000-hp. plant 100 miles from Rio de Janeiro. He also said that the present plant, which only provides 75,000 or 80,000 hp., was not only inadequate but that the water supply in that section was running low.

Men Want Conferences.—The street car men's union has renewed its request of the directors of the United Electric Railways, Providence, R. I., for a conference on its recently submitted draft agreement including a wage increase and the closed shop. In a letter signed by Business Agent Coleman and Secretary Coates the men claim that a proposition which looks to conferences to settle differences is reasonable. The company had called for immediate arbitration.

Wages Increased.—The Frankford, Holmesburg & Tacony Railway, which operates a trolley line to the northeastern section of Philadelphia, has voluntarily granted its employees a wage increase of 3 cents an hour. This makes the new scale 48 cents. The increase, which went into effect on Sept. 16, affects about 100 men.

Disapprove "L" Scrapping. — The trustees of the Boston Elevated Railway are opposed to the removal of the elevated structure and the substitution of subways on the ground that such change would cost $80,000,000. In a special report to the Legislature recently filed, the trustees say that if $80,000,000 is to be spent, the money should be used to provide additional service, which would benefit the community as a whole rather than the destruction of lines already built. They concur in the opinion of the transit commissioners who reported in 1913 that the "advantage to be gained by substituting subways for elevated structures are in no way commensurate to the expense."

Pay Increase Granted.—An increase of from 48 to 73 cents an hour to shop-craft workmen on the Washington, Baltimore & Annapolis Railroad has been granted. About 200 men will be benefited by the increase, it was announced by Edward D. Bieretz, business agent of the Electrical Workers' Union. Several weeks ago the men went on strike after failure to get the increase asked for but were persuaded to return to work pending negotiations.

Benefits of Merger Noted.—As the result of recent consolidations, 1,700 miles of transmission line, serving about 14,000 square miles of territory in Illinois, is now included in the properties of the Central Illinois Public Service Company, Mattoon, Ill. The company has taken over eight concerns in central and southern Illinois. The consolidation, according to officials of the company, makes possible the generation and purchase for distribution to customers of about 175,000,000 kw.-hr. in 1923, as compared with 128,000,000 generated during 1922. The new Central Illinois Public Service Company, as the result of the merger, now includes the Middle West Power Company, Canton Gas & Electric Company, Lewistown Electric Company, Central Illinois Power Company and other utilities.

Franchise Revoked, Cars Still Operating.—Although the franchise of the Waverly, Sayre & Athens Traction Company, in Sayre, Pa., has been revoked, the company is still operating cars between Waverly and Athens. The reason for the revoking of the franchise is bound up with the financial inability of the company to meet all the pavement requirements in Sayre. The borough requires that pavement should be made in accordance with the franchise, i.e., with concrete. The company finished a considerable lot of pavement last fall with tarvia asphalt and intended to finish the remaining ¾ mile in the same manner. The Burgess, however, insisted on the pavement being laid with concrete or the franchise annulled. The business men of Sayre have petitioned the Borough Council to reconsider the revoking of the franchise because of the business loss to the merchants and the inconvenience to hundreds of persons who use the line, but the Borough Council refused to take action in the matter.

Foreign News

Proposed Extensions in Province of Milan

Further Electrification of State Railways and a Subway in City of Milan Under Consideration

The Council of the Province of Milan is negotiating with the Italian Government and a number of traction companies to increase the mileage of electric interurbans in the Province of Milan. Apart from a number of electric interurbans and steam tramways which are now in operation, a great number of country bus lines are giving service in the country, generally in a very poor and unsatisfactory way.

The total mileage of new lines to be built for electrical operation in the Milan province is 63. The lines which are now steam operated and whose electrification will be subsidized by the province total 80 miles.

It is further planned to restore about thirty miles of lines which had been abandoned during the war and after the war period. Several of these companies are considering the adoption of Diesel electric or straight gas rail cars on these short lines.

Genoa-Milan Line

The Italian State Railways has recently added about 36 miles to its three-phase electric system on the Turin-Genoa-Milan triangle. The total mileage now in service is about 300. It is planned to operate fast passenger trains on the section between Genoa and Voghera at a maximum speed of 77 m.p.h. This will shorten the limited train schedule between Milan and Genoa by about thirty minutes. The distance of 95 miles formerly was covered in two hours and forty minutes, there being heavy grades in the electrified section. The State Railways has estimated that the cost of electrification of the track, exclusive of buildings, track repairs and locomotives, has amounted to approximately 1,000,000 lire per kilometer, while new electric locomotives cost approximately 1,200,000 lire each. It is estimated that, apart from the passenger traffic, it will be possible to move 4,000 freight cars daily between the harbor of Genoa, Milan and the Simplon and Gothard lines toward Switzerland.

Franchise for an Underground Road for Milan

At the meeting on July 31 of the Milan Municipal Council, Public Works Commissioner Marchetti gave an account of the franchise negotiations pending between the city of Milan and the Milan Metropolitan Railways for the construction of a system of underground electric railways.

This Italian-French-Spanish Corporation is affiliated with the same interests which control the Paris underground and the Madrid subways, and proposes to invest at least 150,000,000 lire in the construction of three subway lines in the city of Milan. The first line to be built will have as its terminals Loreto Circle, at the northern end of the city where the express and local interurban lines from Monza enter, and the industrial fair grounds at the south. It would have a route mileage of about 5 miles, with fifteen stations. It is purposed to start work this year in order to put the first line in operation by 1925. The two other lines will complete a loop around the city line of Milan and will connect all interurban terminals with the State Railways Central, New and Southern stations and with the Northern Railways station.

Electric Road Takes Over Boat Service

The Italian Minister of Public Works has turned over the operation of the Lake Maggiore steamboat service to the Cisalpine Public Undertakings Company, which is also the owner and operator of the Domodossola-Locarno Electric Railway. From 1916 to the present this steamboat service has been operated by the Italian Government.

New London Underground Railway Offices

To secure greater efficiency and more economic working and administration, a new office building is being erected at St. James' Park Station for the housing of the staff of London's Underground. With the growth in the work it has become imperative that the various staffs, which are now scattered about London, should be concentrated, and to this end designs were prepared for a new office building adjacent to the existing headquarters at Electric Railway House.

Municipal Tramways in England Sold to Private Companies

The Ilkeston Town Council has sold its tramway and electricity undertakings to the Nottinghamshire & Derbyshire Tramway Company and the Derbyshire and Nottinghamshire Electric Power Company, at a figure fully £8,000 greater than the amount required to pay off the outstanding loans. The Town Council is thought to have been fortunate in securing such favorable terms. Some years ago numerous municipalities in England undertook extensive tramway and electric lighting operations, with the idea that the municipalities could operate better and more cheaply than private enterprise. In the case of the smaller towns this has not worked out very well, because the business is done on such a small scale that it is usually uneconomical.

Compagnie Generale Francaise de Tramways

Appropos of the new extension of the accord between the Compagnie Generale de Tramways Francaises and the various municipalities wherein it operates the following figures of the results of recent operations indicate that here, as in so many other cases, the lines are having difficulty in keeping up with the demands upon them, particularly so with respect to the Paris municipal tramways as well as most others in France. Returns have increased greatly, so have running expenses, and the amounts available, or which can be readily had, for real improvements, as well in track renewals as in rolling stock, are by no means adequate. The figures herewith are for eight months' operation, and with the proportionate increase continuing until the end of the year they may well show an augmentation of nearer 15 per cent than 10 per cent. With ulterior increases on the same scale it is certain that a vast system of improvements on all hands will be necessary to cope with the traffic of five years hence.

	Receipts in Francs Eight Months 1923	Receipts in Francs Eight Months 1922
Marseilles....	29,970,811	28,210,906
Le Havre.....	5,778,209	5,656,781
Nancy	4,305,534	3,934,992
Orleans......	965,474	897,594

The total increase is 2,319,756 francs, which for the proper standard of comparison must be turned into dollars at the normal, not the present, rate of exchange, say 5 francs to the dollar. Marseilles, with nearly a million population, has receipts of around $8,000,000 a year, and Orleans, with fifty thousand, but $240,000.

Glasgow Tramway Extension

The tramway department of the Glasgow Town Council on Aug. 1 formally took over the line of the Glasgow Subway Railway and the Paisley & District Tramways as agreed and confirmed by act of Parliament. The subway purchase price was £385,000 and that of the Paisley tramways £250,000. By the addition of these two properties the city's municipal tramway system has been extended by 24 miles, of which 6 miles is accounted for by the subway. The total length of route under the control of the tramway department is now 126 miles.

Narrow Gage and Top Deck Covers

The British Ministry of Transport has refused to sanction the use of top-deck covers for cars running on the narrow gage of 3 ft. 6 in. at Chester, on the ground of the risk of overturning, especially from wind pressure.

Debentures Issued. — The London Underground Railway has issued £6,000,000 of 4½ per cent debentures.

Financial and Corporate

Dismantling Likely

Supreme Court Hears Report of Receiver on Northern Massachusetts and Connecticut Valley Systems

That the Northern Massachusetts and Connecticut Valley Street Railway systems would soon be dismantled in large part, if not wholly, was the tenor of evidence and discussion at a hearing given Nov. 2 in Boston by Judge De Courcy of the Massachusetts Supreme Court on the fourth report of Daniel P. Abercrombie, receiver.

The Northern Massachusetts case was considered first. Mr. Abercrombie said the Athol division was operated at a profit and he believed that sale of it as a going concern was feasible. He said the whole property, if sold for dismantling, would bring about $125,000 and there would be claims of about $60,000, leaving about 10 cents on a dollar for the holders of $500,000 worth of bonds. He added that he believed he could do better than this at a receiver's sale.

Taking up the Connecticut Valley system, Mr. Abercrombie said the lines showed an operating loss of approximately $15,000 since the beginning of the present calendar year, and that passenger revenue in this period had been $41,000 below the corresponding period of 1920. He asked for authority to issue receiver's certificates in the amount of $30,000 to pay taxes and power bills.

Bentley W. Warren, appearing for a bondholders' committee and for two banks holding mortgages, offered objections to a receiver's sale of the properties, preferring foreclosure.

Judge De Courcy directed counsel to try to agree on whether the sale shall be by receiver or through foreclosure, on the question whether or to what extent the lines should be operated in the meantime, and what amount of receiver's certificates should be issued.

On the part of Chambers of Commerce in the larger towns involved some discussion has taken place relative to organizing local companies to take over lines in a position to pay profits, and there have also been conferences with bus operators concerning the feasibility of installing a bus service to supplant the trolley service.

Income Lower, Traffic Increases in Detroit

The total operating revenue for the city of Detroit, Department of Street Railways, during September was $1,843,027 against $1,532,927. The former figure included revenue from transportation amounting to $1,766,670. The total operating expenses for the month of September were $1 360,890, compared with $1,073,417 for the same month a year ago. Net revenue from railway operations was $482,137 in September of the current year. A year ago it was $459,511. The net income shows a slight decrease over that of September, 1922. A year ago it was $61,026, and in September of this year it was $59,213. Total passenger traffic increased from 35,770,063 in September, 1922, to 38,385,837 in September, 1923.

Reorganization of Washington-Virginia Company

A reorganization of the Washington-Virginia Railway is being planned by a noteholders' committee, under which the road has operated for the past three years. The first step in the proposed reorganization will be the filing of petitions in the courts of the District of Columbia and Virginia to have the rights of the various lien holders judicially determined.

The noteholders' committee met in Philadelphia recently and decided to start proceedings for a reorganization. While preparing the court petition, Mattie M. Newcomer, an individual bondholder, unexpectedly filed suit at Fairfax Court House, asking that a receiver be appointed.

The petition for receiver, which was filed by Attorneys Charles H. Merrillat and William M. Ellison, alleged that the company had defaulted in the payment of dividends for the past three years.

The charges brought are that corporation officials have allowed the properties to reach that degree of insolvency through "wrongful misappropriation, waste and reckless improvident and unlawful financiering, abuse of its corporate powers and unlawful diversions of proceeds" of several of the bond issues and mortgages.

Judge Samuel G. Brent has ordered that the defendants to the petition show cause why a receiver should not be appointed.

The allegations made extend over a period of time from 1908 to the present. The two lines—the Falls Church line and the Mount Vernon line—were at that time merged. Clarence P. King, who became president of the consolidated companies in 1908, later became president of the Washington Railway & Electric Company.

The Washington Utilities Company, the petition cites, was created under the laws of Virginia by Clarence P. King as "part of a scheme of accomplishing a huge consolidation of street railway interest in and about the District of Columbia and adjoining states."

This scheme, as well as many others, the petitioner says, collapsed, thus bringing about the state of insolvency in which the company now finds itself.

Judgment Affirmed

Supreme Court Rules Philadelphia Banks Must Give Columbus Railway $1,136,310

The Ohio Supreme Court in affirming the judgment of the Franklin County Court of Appeals in the Augusta Slaymaker case gives the treasury of the Columbus Railway, Light & Power Company $1,136,310 to be paid by E. W. Clark & Company, Philadelphia bankers. This decision ends one of the hardest fought controversies in the railway field.

The story began in December, 1918, when Augusta Slaymaker and other stockholders of the company brought suit to recover money paid to the Clarks for their services as fiscal agents of the local concern.

In December, 1920, shortly after control of the company had been wrested from the Clarks by Charles L. Kurtz and his associates, leave was obtained for it to enter the Slaymaker case via a cross-petition in which it was sought to recover for the company certain sums which, it was claimed, had been obtained or expended illegally by the Clarks. Included in these sums were commissions paid by the Clarks to themselves on the sale of Rail-Light securities; payments made the Clarks for supervision of construction of certain equipment; losses incurred by the "franchise surrender" in 1918; payments made by E. K. Stewart, treasurer under Clark, to John Scott Anderson, C. C. Philbrick, and others from what was denominated the "Yellow Dog Fund," and other alleged illegal payments and expenditures.

JUDGE KINKEAD SUSTAINS JUDGMENT

Judge George B. Okey was named master commissioner to hear the testimony, and after several months rendered his report, finding for the company on nearly every ground. He was sustained, in the main, by Common Pleas Judge Kinkead, whose opinion scathingly arraigned the Clarks for the way in which they had enriched themselves at the expense of the Rail-Light stockholders, and decreed that the Clarks should return to the Rail-Light the sum of $1,512,021 and pay all costs in the proceedings.

Although Judge Kinkead was sustained by the Court of Appeals, the amount of the judgment was fixed at $1,136,310. The principal items follow:

Management contracts	$224,716.05
Profit on sale of stocks	117,841.72
Franchise surrender	64,659.00
Stewart withdrawals	218,527.31
John Scott Anderson	173,273.40
Total	$799,017.48

Interest on these amounts from the date of their payment to April 1, 1923, brought the total of the appeals court judgment to $1,136,310. The Clarks now also must pay interest upon that sum from April 1 to the date of payment of the judgment, and in addition, must pay all court costs as a result of the decision of the Supreme Court.

Charles L. Kurtz, president of the Columbus Railway, Light & Power

Company, said that acquisition of the above-mentioned amount would help toward the improvements and new construction projects that needed to be carried out. He said that new cars were needed as the present equipment was insufficient. His company needs in addition a new power plant which alone will call for an expenditure of approximately $4,000,000, and car line extensions must be undertaken in the near future.

There still remains the possibility of the Philadelphia bankers having the case transferred into Federal Court. The $1,136,310 is subject to orders of the state courts and unless restrained by federal action can be paid to the Columbus Railway at once. The various steps in this controversy have been followed from time to time in these columns.

Investigation of Service Resumption in Kewanee Started

An electric railway line will be salvaged from the junk pile if $140,000 can be raised in Kewanee, Ill., to finance a new company. Pursuant to the stopping of the interurban service between Kewanee and Galva and the city cars in Kewanee recently a representative group of citizens and the board of directors of the Chamber of Commerce have lost no time in delving into the problem of resuming operation of service formerly provided by the Galesburg & Kewanee Electric Railway.

A thorough investigation reveals the fact that new cars and extensive work on the South Main Street line will be necessary, the total cost of the improvements being about $90,000. This with the $50,000 which must be paid to David Wine, the junk dealer who purchased the line, brings the total sum needed to $140,000.

With a capitalization of only $140,000 the belief is general that the cars can be operated at a fair return. So confident is Mr. Wine, the purchaser, of these possibilities that he has offered to take $50,000 of stock in the new concern provided a first mortgage upon the property is given him. E. E. Baker, president of the Kewanee Boiler Company, in behalf of that concern, offered to take $10,000 worth of stock, leaving only $80,000 to be raised.

Indianapolis Company Wants Loan for Tax Purposes

Approval of the negotiation by the Indianapolis Street Railway of approximately $150,000 to obtain funds with which to pay taxes of the company was asked by Robert I. Todd, president, in a recent conference with John H. McCardle, chairman of the Public Service Commission. Although the company is maintaining service in Indianapolis with a 5-cent fare, one of the lowest in the country, the revenue of the company is not sufficient even to pay taxes when due, Mr. Todd told the commissioner.

Under the public service commission law, utilities wishing to make a loan for a period of less than a year are not required to obtain the approval of the commission. Loans made for one year or more must be approved by the commission. Mr. Todd told Mr. McCardle that he was not sure the tax loan could be taken care of within a year.

The financial condition of the company and the continuance of the 5-cent fare in Indianapolis, it is said, depend largely upon the outcome of the application of the Terre Haute, Indianapolis & Eastern Traction Company for a certificate of convenience and necessity to enter the electric field in Indianapolis. The commission and the City Council both approved the plan. The matter was carried to the courts by other electric companies objecting to the granting of the certificate. The action of the commission was upheld in the Circuit Court and the case is pending before the Supreme Court.

The Terre Haute, Indianapolis & Eastern case has a direct bearing on the railway situation, it was explained, because the electric company is to provide electric current for the car company. It has been stated that the saving to the car company on electric current would amount to enough to pay the taxes of the company.

Holdings in Waterloo Relinquished

During a special meeting in Waterloo, Iowa, of the board of directors of the Waterloo, Cedar Falls & Northern Railway, C. D. Cass and L. S. Cass, president and general manager of the traction system, relinquished all their holdings to the bondholders to develop a bus line. They now have big buses operating between Waterloo and Cedar Falls and have made plans to extend their lines to Winthrop on the east. It is believed their future plans will include development of bus transportation in central Iowa.

C. M. Cheney, vice-president of the Des Moines & Central Iowa Interurban Company, was named president and general manager to succeed the Cass brothers in the interurban property they relinquished.

The property is valued at between $9,000,000 and $10,000,000, with $7,500,000 indebtedness against it. Of this amount there are $5,500,000 in first mortgage bonds, with the company owing the balance of $2,000,000 to the government.

Cass brothers have sought to have the affairs of the company adjusted to the satisfaction of the bondholders for some time past, since it was seen that the railway was being operated at a loss each month. The average loss a month is approximately $12,000. The transaction was friendly in every particular.

With Waterloo as a center, the company has lines extending to Cedar Rapids, Waverly and Cedar Falls, besides the city service in Waterloo and Cedar Falls.

Birmingham Receivers Allowed to Default Interest Payment

The lifting of the receivership of the Birmingham Railway, Light and Power Company on Jan. 1 is made possible by a decision of Judge W. I. Grubb of the United States Court for the Northern District of Alabama, allowing the receivers to default in the payment of interest due on Nov 1 on the refunding and extension mortgage bonds of the company. Judge Grubb handed down his decision at a hearing held in Birmingham on Oct. 30.

Some time ago it was agreed that the bonds, which are held by various parties and which amount to $4,600,000, be deposited with a committee for redemption. It was stated at the meeting held before Judge Grubb that 75 per cent of these bonds have already been deposited with the committee. Arrangements are made to purchase from the committee all coupons due on these bonds Nov. 1. Practically all of these bonds held by parties in Birmingham have been deposited with the committee and many from other places also. There was some difficulty in locating all of the bonds, hence the time for their deposit with the committee was extended from Oct. 31, 1923, to Dec. 1, 1923.

At the hearing held before Judge Grubb Attorney W. B. White of Tillman, Bradley & Baldwin, appeared for the co-receivers of the Birmingham Railway, Light & Power Company, Lee C. Bradley and J. S. Pevear. Attorney Powell C. White of New York appeared for the bond holding committee. There was no protest offered against default in the payment of the 6 per cent interest on the bonds. In all cases where bonds have been deposited checks are being mailed to the holders.

It is intimated that with the lifting of the receivership, which is to take place about Jan. 1, 1924, many improvements will be made by the Birmingham Railway, Light & Power Company, in the way of new equipment and the extension of some of its lines. With the elimination of the jitney and the reduction of cash fares from 8 to 7 cents traffic on the cars has increased considerably.

New Directors Elected in St. John

At the annual meeting of the stockholders of the New Brunswick Power Company, St. John, N. B., the following board was elected: Walter C. Allison, of Manchester, Robertson & Allison, Ltd., St. John; W. S. Fisher of Emerson & Fisher, Ltd., St. John; L. C. Gerry of Bodell & Company, Providence R. I.; W. E. Golding of George McKean and Company, Ltd., St. John; J. L. McAvity of McLean, Holt & Company and T. McAvity & Sons, Ltd., St. John; A. P. Paterson of Baird & Peters, Ltd., St. John; M. A. Pooler, general manager and vice-president of company; E. N. Sanderson, New York, president of the company, and Richard Sullivan, broker, St. John.

Iowa Property Sold

David G. Fisher, president of the Iowa Southern Utilities Company, operating the street railway lines of Centerville, Iowa, and the electric interurban railway between Centerville and Albia, Iowa, and Centerville and Mystic, in addition to serving forty-one cities and towns in southern Iowa with electric power, has sold his entire interests and control of the corporation to George M. Bechtel of Davenport. Mr. Bechtel is president of Iowa's oldest bond house, George M. Bechtel & Company, and a bank director and manufacturer in Davenport.

The Iowa Southern has been a financial success since it was organized by Mr. Fisher and associates in 1916, with four power plants in the vicinity of Leon, Iowa, as a nucleus. In 1919 Centerville's utilities were purchased and in 1921 Newton, Iowa, and adjacent territory were added to the chain.

The corporation's interurban railroad is the outlet for the coal mines of Monroe County, which would not otherwise have easy access to the markets. An approximate tonnage of 100,000 tons is moved over this interurban annually, this being the principal freight handled by the road.

Beginning with a population of 5,000, the Iowa Southern now serves a population considerably in excess of 75,000. Extensive power plant extension and development and transmission line extension have taken place in recent years.

Can't Agree on Third Arbitrator for Substation Appraisal

All efforts of the city of Seattle and the Puget Sound Power & Light Company to appoint a board of arbitration, satisfactory to both parties, to appraise two railway substations to be taken over by the city in November have met with failure. The city and the company have agreed upon two arbitrators, but in an effort to name a third each has selected seven arbitrators, who have been rejected by the other party. James B. Howe, counsel for the company, has asked that Mayor Brown certify, on behalf of the city, that the arbiters named by the two parties have been unable to agree upon a third arbiter, as a preliminary to action by the company to have Chief Justice John F. Main of the State Supreme Court designate the third arbitrator.

Mayor Brown has been advised by Corporation Counsel T. J. L. Kennedy that the Mayor has no authority to certify, except under an ordinance passed by the City Council specifically directing him to do so. The three appraisers are to fix the value of the two substations to be taken over by the city with the first block of 5,000 kw. of the power service now being sold to the Seattle Municipal Railway by the company. The contract by which the city bought the railway lines gave the city the right to reduce the power contract in 5,000-kw. blocks, provided the city paid the company for the substations. The company has the right, on five years notice, to reduce the power service without requiring the city to buy the substations. The city has served one year notice of its intention to take over the first block and substations in November.

Melbourne System to Be Extended

Plans Under Consideration Contemplate a Total of 266 Route-Miles of Electric Railway

The report of the Melbourne and Metropolitan Tramways Board for the year ended June 30, 1923, shows that its plan for a general tramway scheme, with the abandonment of the present cable line and an increase in the tramway route mileage from 125 to 266 before the year 1940, has been accepted by the Parliamentary standing committee on railways. It is now before the Minister of Public Works. The preparation of this plan occupied the board and its officers for about two and one-half years and provides for probable growth in tramway and railway traffic for twenty years ahead.

On April 5, 1923, the board entered into an agreement with its employees, following the decision of the Commonwealth Court of Conciliation and Arbitration, providing for an increase of pay of 4d. per day to the traffic staff, three days good conduct leave in addition to the usual twelve days annual leave, and time and a half for all work on Sundays and holidays. This agreement will add £60,000 to the annual wages bill. It also provides for quarterly adjustment of wages in accordance with the Commonwealth statistician's cost of living figures. Based on these figures for the quarter ended June 30, 1923, the wages on Aug. 1, 1923, were further increased by the sum of £55,000 per year. The contract will remain in force until March 31, 1925.

Population served by tramways		667,000
Journeys per head of population served per annum		340
	Cable	Electric
Gross capital expenditure	£2,162,725	£1,946,569
Mileage of double track	45.9	53.3
Mileage of double track (horse)	.625	....
Mileage of single track	....	19
Traffic receipts	£1,254,282	£656,996
Total revenue	£1,260,912	£661,486
Working expenses	£924,789	£503,166
Balance of revenue over operating expenses	£336,123	£158,321
Car-miles (cable, 14,832,416; horse, 9,808)	14,842,224	6,742,428
Passengers carried	155,820,153	70,811,393
Average maximum number of cars in use daily	477	177
Percentage of working expenses to total revenue	73.34	76.07
Average traffic receipts per car-mile	20.282d.	23.386d.
Average traffic receipts per mile of single track	£13,480	£5,230
Average traffic receipts per passenger	1.93d.	2.226d.
Average total receipts per car-mile	20.39d.	23.55d.
Average speed per hour, including stops	9 miles	10 miles
Scale of fares	1d. to 3½d.	1d. to 7d.
Average distance per penny (1d.)	1.44 miles	1.104 miles
Average number of passengers per car-mile	10.41	10.50
Number of cars in stock	601	204
Average number of kilowatt-hours per car-mile	....	2.353
Number of employees	3,035	1,840

Considerable new construction has been completed during the past year, including a sample center-entrance car which proved so satisfactory in service that ninety others have been ordered. Two single-truck safety cars will be imported from the United States. The number of electric cars now in service is 204, made up of 155 single-truck and 49 double-truck cars. On the cable systems there are 592 grip cars and 597 other cars. New carhouses with sprinklered fire protection have been installed. The program for improvements during the next three years calls for an expenditure of £1,700,000.

Statistics for the year ended June 30, 1923, are given in the accompanying table.

Suit Fails to Compel Payment of $350,000 Tax

Efforts to force the Cincinnati Traction Company and the Cincinnati Street Railway to pay the city of Cincinnati $350,000, claimed to be the amount of tax due the city for 1920, failed on Oct. 17, when Judge Stanley Struble, in the Hamilton County Common Pleas Court, dismissed the suit of Attorney Robert S. Alcorn, suing as a taxpayer. The court took the view that the railway, owing to the fact that it leases its properties to the traction company, is not in any sense liable to the city for the payment of the tax, and that this company is entitled to be dismissed as a defendant.

The suit charged that the companies were obligated to pay the tax of $350,000 annually under the ordinance passed in August, 1918. The plaintiff also claimed that the gross receipts of the defendant companies in 1920 were sufficient to pay the tax, but that the city and the companies entered into a conspiracy to release the companies from the payment. As an end to the alleged "conspiracy," it is charged that the City Council passed an ordinance in 1921, which sought to change the method of accounting so as to postpone the payment of the tax for 1920 to 1922. The acceptance of the 1918 ordinance by which the public became a party in the management of the properties of the defendant companies is mentioned by Judge Struble as enabling the public to escape the fear of it, not the actual exploitation incidental to private control on the one hand, and a large capital investment incidental to municipal ownership on the other.

Judge Struble in his opinion declared the gross earnings were made a trust fund in the hands of the operating company and the remedy of the city for any misapplication or failure to apply them to the purposes named in the ordinance, would be in a court of equity to compel the observance of the obligations of the trust, rather than an action at law for a money judgment.

He says that if the operating company should refuse to obey the order of a court of equity to pay this tax to the city where the gross earnings were sufficient to pay the tax, the court no doubt would have the power as a means of enforcing its order to render a personal judgment against the operating company.

The court said regarding this:

> These claims which counsel made orally are not included in the plaintiff's amended petition and if true make an entirely different cause of action than that stated in the amended petition upon which the parties went on trial. The cause of action to be tried here is the one stated in the pleadings, not the one in the oral statement of counsel. The city of Cincinnati can recover this tax for the year 1920 by merely refusing to agree to further postponements of its payment, thus forcing the traction company to include this tax in the cost of service for future years, thereby increasing its earnings by an increase in taxes.

Alabama Power Takes Control of Tuscaloosa Property

The property of the Tuscaloosa Railway & Utilities Company of Tuscaloosa, Ala., with the exception of the creamery and ice plant, became the property of the Alabama Power Company by the filing of a deed for record on Nov. 1.

The cars in Tuscaloosa are now being operated by the Alabama Power Company, under the superintendency of T. L. Beauchamp, formerly district manager for the Alabama Power Company at Decatur, Ala.

J. M. Barry, manager of retail operations of the Alabama Power Company, with offices in Birmingham, Ala., was in Tuscaloosa on Nov. 1 in connection with the transfer of the railway. He stated that a better service would be given in Tuscaloosa than had been given heretofore. He said the company would at once place voltage regulators on all feeder electric lines, insuring a more even voltage, and will make many general improvements in the service.

The master mechanic of the Alabama Power Company from Montgomery, Ala., is spending several days at Tuscaloosa looking over the rolling stock of the street car company and also examining the tracks. He says improvements will also be made in this branch of the service.

Heavy Deficit Represents Strike Costs. — The International Railway, Buffalo, N. Y., for the nine months ended Sept. 30, 1923, had an operating revenue of $7,269,457 against $8,065,828 a year ago. The operating expenses and taxes amounted to $6,920,570. This represented a decrease in comparison with the nine months ended Sept. 30, 1921, when the operation and taxes amounted to $7,062,555. The deficit for the nine months ending Sept. 30 of this year was $792,876, which far and away exceeded the deficit of the same period in 1921, but the loss from operation for the nine months ended September of this year represented strike costs. It will be recalled that the company did not operate full service in 1922 due to the strike on its property.

Auction Sales in New York.—At the public auction rooms in New York on Nov. 7 there were sold $1,213 South Carolina Gas & Electric Company, Spartanburg, S. C., certificates of indebtedness, 16¼ per cent.

Bonds Offered.—Aldred & Company, New York, are at the head of a syndicate which is offering at 95 and accrued interest to yield 6⅜ per cent $3,540,000 of the first mortgage thirty-year 6 per cent sinking fund gold bonds series "A" of the Quebec Power Company. The bonds are dated Oct. 1, 1923, and are due Oct. 1, 1953. The proceeds of this financing will be applied to cover the purchase price of consolidated mortgage bonds of the Quebec Railway, Light, Heat & Power Company, Ltd., purchased by the Quebec Power Company and hypothecated in favor of the company's total authorized issue of bond and to furnish funds for further additions, improvements and extensions to hydro-electric power plants, transmission lines and distribution systems.

Order to File Claims.—The United States District Court, Southern District of Ohio, recently ordered Harry Hartwell, receiver of the Ohio Electric Railway & Power Company, which is the defendant in the case of the Columbia Avenue Trust Company, Plaintiff, vs the Ohio Electric Railway & Power Company, to serve notice on the company's creditors that unless they file their claims by Nov. 20 the claims shall be barred. The court said that they must be filed in the receiver's office in the city of Pomeroy, Meigs County.

Net Earnings Increase. — The net earnings of the Illinois Power & Light Corporation for the twelve months ending Sept. 30 are 33 per cent higher than the net of the corresponding period last year, according to figures made public recently. A portion of the big increase for the period is due to additional properties acquired by the corporation during the year. The net earnings for the twelve months amounted to $8,792,517. In the same period in 1922 they were $6,801,017. The Illinois Power & Light Corporation was organized on June 1, this year. The twelve months earnings are those of the companies merged to form the new concern. The net earnings for 1923 are more than double the interest charges on the entire funded debt of the company.

Debentures Offered.—A. B. Leach & Co., Inc., and the Federal Securities Corporation, New York, are offering at 98¼ and accrued interest, to yield 7.25 per cent, $2,250,000 of the Public Service Company of Colorado ten-year 7 per cent sinking fund convertible gold debentures. The debentures are dated Oct. 1, 1923, and are due Oct. 1, 1933. These debentures are being issued to provide for part of the cost of the properties being constructed for and acquired by the consolidated company. The Public Service Company of Colorado is a successor by merger to the properties of the Denver Gas & Electric Light Company and the Western Light & Power Company.

Will Receive Bids.—The Guaranty Trust Company, New York, N. Y., will receive until Nov. 12 bids for the sale to it of the first refunding and collateral trust mortgage 6 per cent gold bonds of the Philadelphia Company. The bonds are known as series "A" and are due Feb. 1, 1944. The amount received must be sufficient to exhaust $120,079 at a price not exceeding $105 and interest.

Will Consider Stock Increase.—The Charleston Interurban Railroad, Charleston, W. Va., will hold a meeting of its stockholders on Nov. 27 for the purpose of increasing its capital stock to $3,000,000, it has been announced by Arthur F. Hill, secretary of the company. The stockholders will act upon a resolution that will increase the present 15,000 shares of stock of the par value of $100 each to 30,000 shares of stock of the par value of $100 each. The 15,000 shares of preferred stock are to be issued upon such conditions and with such preferences as may be determined at the meeting. The call for the meeting was issued in accordance with the terms of a resolution adopted by the board of directors on Oct. 19. It is stated that the past year has been one of the most successful in the history of the company, and plans are in process of formation for new equipment, additions and extensions.

Consolidation Being Discussed.—At a special meeting of the board of directors of the Potomac Public Service Company, Frederick, Md., matters pertaining to the consolidation of the properties of the Potomac Public Service Company and the Cumberland plants were discussed. While no announcement was made it was said that definite steps will be taken at an early date to effect a consolidation of the two.

Service Resumed and Buses Purchased.—Service has been resumed on the interurban line that runs from Bryan, Tex., to College Station, where the Agricultural and Mechanical College of Texas is located. This line was recently sold under receivership, and a new company, the Bryan-College Traction Company, capitalized at $27,500, was organized to take it over. The incorporators of the new company are E. H. Edge, J. M. Lawrence, E. H. Austin and others. An hourly schedule of cars both ways has been in effect and will be maintained during the college year, it was announced by the new owners. The company has purchased three buses put in operation by the students of the college when the interurban discontinued service last year.

Earnings Increase.—The Virginia Railway & Power Company, Richmond, Va., in a nine months financial statement just issued shows gross earnings of $7,777,696 and a balance after all deductions of $933,975. Earnings by comparison with last year increased 13.86 per cent. Operating expenses increased 8.83 per cent.

Traffic and Transportation

No Five-Cent Fare Now

Altoona Railway Official Says Problem Is to Exist at Present Rates—Wages Should Attract Employees

That there will be no return to the nickel fare soon and that the trolley company is worrying more at present with the problem of how it can keep going on existing fares, is the summary of a statement by General Manager S. S. Crane of the Altoona & Logan Valley Electric Railway in reply to published statements in local newspapers to the effect that "the return of the nickel street car fare would not occur until a certain regulatory body was dismissed from the control of street railway fares." The 7-cent fare in Altoona, Pa., has been in effect for several years.

In his answer Mr. Crane referred to the general impression that public utilities are making too much money. He said there seemed to be an idea current that the public utilities had some means of securing money out of the air, so to speak, or that they had some occult means of making a dollar go further than others can. He said that how it could be presumed that the utilities escaped the condition of high cost of living was to be wondered at, for the same condition that confronts the individual also applies to the utilities.

SOME PROPERTIES EXCEPTED

It was his belief that the problem before practically all the street railways of the country was not the question as to when they should reduce the fares, but rather how they could keep on going on the existing rates. He said that the exceptional railways were those so situated in the midst of heavy traffic, well distributed throughout the day, frequent interchange of loadings, relative short hauls, or other advantageous conditions that their present fares supply their needs. The statistics of the industry as a whole, he went on to say, showed that since 1913 the average rate of fare had increased from 4.84 cents to 6.88 cents (44 per cent), while the cost of materials had increased 69 per cent and the rate of wages 114 per cent during that period.

He then went on to give some statistics of his own property. For that same period there had been an increase in labor and material expenses, exclusive of taxes, rentals, interest, and the like, of 91 per cent, against an increase in receipts of 83.9 per cent, partly due as to the latter to an increase of 22.2 per cent in the number of riders. Under peak conditions in the year 1920 the increase in operating expenses was 149 per cent, in receipts 97.9 per cent and in passengers hauled 44.7 per cent. Still the total increase in fares was only 40 per cent. He said that this status of affairs represented the industry at large.

He said that the increased fare partly covered the situation, but that the major result was obtained by neglecting the property. He meant by that, he said, that expenditures for the maintenance of the physical property were reduced to a minimum and deferred with the hope of more favorable future conditions, which condition has not obtained as yet. It was his contention that the rate of wages on the railways needed no apology, except it was that of being too low, as the industry would have to establish a rate that would attract employees, and it has scarcely done even this.

One of the important problems before the industry was to determine some method by which operating costs could be reduced, not with the idea of reducing the fare, but with the view of making the present fare sufficient for its needs. This method, adopted for the present, was the using of one employee to a car instead of two. He said that his company had within the last year expended close to $150,000 to improve the power plant by the installation of a new engine and entirely with the view of reducing expenses in that department.

He concluded by saying that the industry recognized the obligations to the public and was endeavoring in every way to meet them, and that when conditions were favorable and justified the public could be assured that the company would do its part.

Ticket Sales in Atlanta Increase

Nearly twice as many persons will invest in tickets when sold at the rate of three for 20 cents as will buy fifteen of them for $1. This at least is the experience in Atlanta during the past three months. The three-ticket rate mentioned above was put in force on July 1, 1923, by the Georgia Railway & Power Company, supplementing the fifteen-for-$1 rate in existence for some time. The cash fare in Atlanta is 7 cents. A statement covering passengers carried and tickets sold during nine months in 1922 and 1923 follows:

Month	1922 Total Pay Passengers	1922 Tickets	1922 Per Cent	1923 Total Pay Possengers	1923 Tickets	1923 Per Cent
January	5,750,310	1,182,415	20.56	5,916,213	1,194,226	20.19
February	5,398,456	1,126,659	20.87	5,408,295	1,131,820	20.93
March	6,064,062	1,262,112	20.81	6,361,049	1,305,749	20.53
April	6,253,255	1,221,575	19.54	6,256,294	1,264,844	20.22
May	6,454,443	1,282,515	19.87	6,648,031	1,316,879	19.81
June	6,083,186	1,139,033	18.72	5,140,391	1,185,522	23.06
July	6,166,925	1,078,916	17.50	6,466,118	2,031,012	31.41
August	6,125,712	1,130,335	18.6	6,449,478	2,237,125	34.7
September	6,246,253	1,201,644	18.6	6,403,190	2,262,641	35.3
Nine months	54,542,602	10,625,204		55,049,059	13,929,818	

Buses Proposed for District of Columbia

A proposal to parallel the street railway lines of Washington with modern buses, "without interfering with said railroads except by fair competition," was submitted to the District of Columbia Public Utilities Commission by Arthur E. Randle, president of the East Washington Heights Traction Railway, on Oct. 31. Mr. Randle coupled with his proposal an offer to pay the District government, in return for such franchise, 1 cent per passenger carried by the buses, or $1,000,000 annually.

The proposition, accompanied by a certified check for $25,000 as an evidence of good faith, was placed before the Public Utilities Commission during consideration by that body of a proposal by the Capital Traction Company to operate a bus from the terminus of one of its lines at Seventeenth Street and Pennsylvania Avenue, Southeast, across the Anacostia River into Randle Highlands. This bus feeder will parallel for some distance the line of the East Washington Heights Traction Railway, of which Mr. Randle is president. The East Washington company operates a single-track suburban line, with two cars in service. Citizens along the line had petitioned for improved service.

The commission granted the Capital Traction Company permission to operate the bus into Randle Highlands on Nov. 1. No action was taken on the offer of Mr. Randle, who did not disclose his associates in the proposition.

Economy to Be Effected in Grand Rapids

In order to keep fares at their present rate, seven rides for 50 cents, the Grand Rapids Railway has found it necessary to discontinue one of its through lines reaching from the northwest city limits through the downtown section to the Wealthy Street carhouse, in the southeast section. This change, according to General Manager Louis J. DeLamarter, will save the company approximately $70,000 a year and will not make it necessary to charge 25 cents for three rides. The only other alternative, he stated, would have been to put all cars on a twelve or fifteen-minute schedule if fares were not to be changed. The abolishment of the through line has necessitated agreement between the railway and the City Commission on three short lines to care for the territory formerly covered. The City Commission at first protested the plan on the ground that a stub line would not adequately serve the Scribner-Street district, part of the territory covered by the old route.

Mr. DeLamarter, in reference to the change, said that his company during the past four months had carried a half million fewer passengers than during the same period last year and that the changes would not work a hardship on any one.

Refuses Blanket Certificate

The Ohio Public Utilities Commission on Oct. 29 refused to grant the Youngstown Motor Transportation Association a blanket certificate, authorizing its more than 100 jitneys to operate under the new motor bus law. Following the hearing of the protest filed by the Youngstown Municipal Railway, the commission ruled that the association was not entitled to a blanket certificate for all the jitneys because the cars were owned by individuals who were members of the association and not by the organization. Ten days time has been allowed by the commission for the separate jitney owners to file their applications and affidavits for certificates, and each bus will be considered separately.

Charges were made by Ross Raymond, president of the Motor Transportation Association, against Harry Engle, the Youngstown Street Railway Commissioner, charging him with fighting the jitneys persistently and trying to eliminate them as competitors.

A. S. Somers Addresses Chamber of Commerce

In a recent address before the Brooklyn Chamber of Commerce Arthur S. Somers, director of the Brooklyn-Manhattan Transit Corporation, declared that the 5-cent fare was not a fixture in New York. He referred to a statement made at the recent convention of the American Electric Railway Association in Atlantic City that the 5-cent fare was now "virtually extinct." He said he believed that we had seen the last rail laid in the streets of the metropolitan district. He believed that buses under responsible control and direction might be tried, but that the initiative rested with the public.

In summing up the Brooklyn transit situation he said in part:

> The city has invested $162,000,000 in the B.-M. T. system alone.
>
> The city has received no return on this investment.
>
> Every private investor who put $1,000 in the B. R. T. in 1912 has lost $433.

Drop in Percentage of Transfers Collected

Boston Finds Not So Many Presented Since Time Limit Is More Easily Checked

The effect of placing an easily checked time limit on transfers is to reduce the number presented for passage, according to the experience of the Boston Elevated Railway. That company put the Moran transfer into general use on its system on Jan. 1, 1923, and there has been a reduction to 75.15 per cent in the number of transfers collected to those issued. A table showing the percentages follows:

	Number Issued	Number Collected	Per Cent Collected
Nine years prior to change of style	690,370,933	566,717,149	80.64
January, 1923	6,155,809	4,584,714	74.48
February, 1923	5,637,514	4,223,895	74.92
March, 1923	6,308,957	4,823,486	76.45
April, 1923	5,977,524	4,558,304	76.26
May, 1923	6,363,008	4,859,410	76.37
June, 1923	6,082,908	4,617,582	76.00
July, 1923	5,848,367	4,325,667	73.96
August, 1923	5,673,586	4,205,412	74.12
September, 1923	5,713,382	4,206,156	73.62
Average nine months 1923			75.15

If all of the passengers who were prevented from using transfers because of the expiration of the time limit paid a cash fare, the additional revenue to the company based upon the operations for the nine months ended Sept. 30, 1923, would amount to $32,854 per month. If one-half of the passengers walked rather than pay another fare, the additional revenue would have been $16,427 per month. The present Boston transfer was described in the issue of this paper for July 7, 1923.

Write About Your Courteous Conductor

The Allentown *Chronicle and News* is going to present to the most courteous conductor on the lines of the Lehigh Valley Transit Company two tickets for the Lyric Theater. This procedure will be carried on every week during the winter months. The *Chronicle* believes that there are many polite conductors lurking around who do not receive enough attention for their courteous acts. The newspaper has called upon the public to help in this campaign of looking for the most polite street car conductor.

The public is called upon to write of its experiences with conductors. When some very aged, infirm or otherwise unfortunate individual receives help from a courteous conductor, the public is asked to tell about it in writing, or when some special act of consideration is shown to patrons by a conductor, it is suggested they get his number and the line on which he works, and then write in and tell the newspaper all about it. At the end of the week the editors will check up and determine who is the most deserving and the tickets will be mailed out just as soon as possible after a choice has been made. In the words of the *Chronicle and News*, "Keep us posted."

Trackless Trolley Line Approved.—Following the approval of the Public Service Commission, the Rochester Railways Co-ordinated Bus Lines, Inc., a subsidiary of the New York State Railways, opened crosstown trackless trolley service through Rochester's north end over Driving Park Avenue on Nov. 1. The fare rate is the same as charged by the Rochester trolley lines and transfers are to be exchanged between the trolleys and the new line.

Plans Further Bus Operation.—In a recent statement regarding the present traffic congestion in Philadelphia, the Philadelphia Rapid Transit Company announced that it was planning to operate motor buses, such as are now used on Roosevelt Boulevard, through streets that are not now occupied by the company, or from which existing car tracks could be removed. The company said that there would be no relief on Chestnut and Walnut Streets until the proposed Chestnut Street subway had been built. The statement also referred to the number of cars purchased by the company this year, and how many had been received and assigned to regular service. Reference was made to the trackless trolley operation on Oregon Avenue.

Fare Limit Extended.—The Manhattan & Queens Traction Corporation has established a second fare point at Old Mill Road, Elmhurst, L. I., instead of at Grand Street and Queens Boulevard. This change extends for nearly a mile, the length of the 5-cent ride to and from Manhattan. As a result of the new order, it is possible for passengers to start from points between Grand Street and Old Mill Road and ride for 5 cents to either end of the line.

Rate Hearing Postponed.—Hearing on the rates of the International Railway in Buffalo, scheduled for Oct. 31, before the Public Service Commission at Albany was postponed until Nov. 12 at Buffalo because of inability of witnesses to attend.

Employees' Suggestions in Force.—Valuable suggestions have been received from employees of the Monongahela-West Penn Public Service Company, according to Capt. George M. Alexander, president of the company, as a result of an effort made several weeks ago to have practical pointers submitted by men on the job. These suggestions proved to be the chief subject of discussion at a recent conference of the operating officials of the company and some of them have been put in force.

Want Buses. — The Missouri Public Service Commission on Oct. 31 held a public hearing on the joint application of the city of Nevada, Mo., and the Fort Scott and Nevada Light, Heat & Power Company to substitute motor buses for the railway system in Nevada. Several citizens protested against the proposed plan. Under the proposed change the company would charge the same fare. In its petition it set forth that the car system has been operated at a loss since 1919.

Book Reviews

Kent's Mechanical Engineers' Handbook

By the late William Kent; tenth edition, rewritten by Robert Thurston Kent, editor-in-chief, and a staff of specialists. John Wiley & Sons, Inc., New York, 1923.

In the twenty-eight years that have elapsed since the first edition of "Kent's Handbook" was published, it has become so well known among engineers that little space is needed to describe it, covering as it does all phases of mechanical engineering practice, and such allied subjects as needed by the mechanical engineer. Each edition, however, has been larger than its predecessor until the present volume, consisting of 2,247 pages, is almost 2⅛ in. thick, even though printed on thin paper. This is some 50 per cent larger than the last edition.

This edition follows the plan adopted in a number of other handbooks, of having the various sections written by specialists. Some thirty-five men well known in their respective fields have assisted the editor-in-chief in this work.

Much of the material in the book has been entirely rewritten to conform with the latest practice. Subjects thus treated include fans and blowers, hydraulic turbines, the steam engine, steam turbines, gas producers, gas engines, oil engines, hoisting and conveying, refrigeration and ice making, heating and ventilation. A considerable amount of other material is included in the handbook for the first time, such subjects including gas turbines, automotive vehicles, aeronautics, industrial furnaces, forge shop, fusion welding and cutting, malleable castings, reinforced concrete and safety engineering. In the sections not included for the first time or entirely rewritten many paragraphs have been thoroughly revised so that the book is abreast of current practice. A complete index of 113 pages is included for use in finding references.

Laminated Springs

By T. H. Sanders, M.I.Mech.E., M.I. and S.I. The Locomotive Publishing Company, Ltd., London; Spon & Chamberlain, New York, N. Y.

This book is a comprehensive treatment of laminated types of springs, particularly for railway service. It is based on a series of articles on "Laminated Railway Springs," which appeared in recent years in the *Locomotive Railway Carriage and Wagon Review*, London.

The first six chapters are taken up with a discussion of the mechanics of the spring, treating it very largely from a practical standpoint. The next four chapters are concerned with stresses in springs, deflections, and formulas dealing with different forms of spring. Chapters 11 to 24 are concerned with the design of springs of various types, this being taken up in considerable detail.

The second part of the book, consisting of chapters 25 to 44, covers the manufacture of springs. This includes the manufacture of sections of steel, forging and cutting the material, methods of fastening and checking play, hoops and methods of attachment, fittings of hoops and finishing springs.

While the book is written from the British standpoint, considerable space is given to American practice. The book should be useful to railway men or others who are interested in the design of laminated springs.

Retail Prices—1913 to December, 1922

Bulletin No. 334 of the United States Bureau of Labor Statistics. United States Department of Labor, Washington, D. C.

This is a publication in the retail prices and cost of living series of the Bureau of Labor Statistics. It includes detailed tables and charts covering the range of prices of food, coal, gas and dry goods by months over the period included. It should be of value to the electric railway man in connection with wage agreements and similar problems.

Employment Hours and Earnings in Prosperity and Depression

By Willford Isbell King of the staff of the National Bureau of Economic Research, Inc. Published by the Bureau, New York, 1923. 147 pages.

According to the sub-title, this book is the result of an inquiry conducted by the National Bureau of Economic Research with the help of the Bureau of Markets and Crop Estimates and the Bureau of the Census, for the President's conference on unemployment. The work was carried on under the supervision of the committee on unemployment and business cycles, appointed by Secretary Herbert Hoover of the Department of Commerce, who was chairman of the conference. This committee had as its chairman Owen D. Young, chairman of the board of directors General Electric Company.

It was found that there was a surprising dearth of information concerning actual employment conditions in the United States, and the investigation, whose results are recorded in the book, has made a considerable addition to the knowledge of conditions of employment in this country.

Numerous statistical tables are included, giving the number of employees in various industries; the volume of employment, showing the proportion of full-time work by employees in various classes of industry; the hours worked per week; the earnings of employees, both total and per hour or per day.

The statistics collected in the book show the relative responsiveness of different industries to the forces giving rise to the business cycle. It indicates the comparative ability of large and small scale business to resist such forces. Shifts of population from one industrial field to another, and the variations in hours and earnings of employees of a company as it changes from boom to depression are traced. The approximate total reduction in employment brought about by the depression of 1921 is also estimated.

Railroad Electrification and the Electric Locomotive

By Arthur J. Manson, Westinghouse Electric & Manufacturing Company. Simmons-Boardman Publishing Company, New York, 1923.

A sub-title states that this book is an "outline of principles involved in railroad electrification. A comparison of steam and electric locomotives. History of electrification in United States. Data on electrification in America, Europe and Australia." It originally appeared as a series of articles in the *Railway Electrical Engineer* and *Railway and Locomotive Engineering*, but has been enlarged upon and rearranged by the author.

The purpose of the book is not very evident. It is quite elementary, the first six chapters being taken up with the simplest laws of the electric circuit, after which five more chapters deal with the general principles of railway motors and their control and the mechanics of traction. This portion constitutes one-fourth of the entire book.

Following this introductory matter the author considers tractive effort in steam and electric locomotives and energy losses incurred by various methods of acceleration and regenerative braking, three chapters being devoted to these subjects. The next eight chapters are mainly descriptive, covering air brakes, contact lines, pantographs, third rail shoes, transformers and auxiliary apparatus, control apparatus, construction of the railway motor, and mechanical design of the electric locomotive. A short chapter on locomotive inspection follows this.

The next five chapters of the book deal with the theoretical solution of typical electrification problems. Introductory to this there is a discussion of the speed-time curve, with an explanation of analytical and graphical methods of calculation. Then a specific problem is taken up in detail, the train sheet being used as a starting point from which the choice of motive power, distribution system and substation location are worked out. The main portion of the book ends with a short discussion of the electrification system of the future and its cost of operation.

An appendix gives brief descriptions of several American electrifications, followed by tabulated data showing the extent, type of system, construction details, power distribution and generation, locomotives and multiple-unit equipment.

The book is not likely to be convincing to the reader. The illustrations from practice seem to have been taken from the work of one manufacturer only, and the question of systems, which has been such an important factor in the past, is greatly subordinated. Its greatest value would seem to be that it has brought together a large amount of data on existing electrifications, which is thus made available for study.

Personal Items

Leon H. Johnson Purchasing Agent in Anderson

Leon H. Johnson has been appointed purchasing agent for the Union Traction Company of Indiana with headquarters at Anderson. He succeeds Hudson R. Biery, who recently accepted the position of assistant to the president with the Indianapolis & Cincinnati Traction Company. Mr. Biery's appointment was referred to in the ELECTRIC RAILWAY JOURNAL, issue of Sept. 22.

Mr. Johnson has not been identified with the electric railway business, but brings into it an unusual and valuable store of experience, gained in his association with such concerns as the Toledo Shipbuilding Company of Toledo, Ohio; the Struthers-Wells Company of Warren, Pa., and the Anderson Foundry & Machine Company of Anderson, Ind., serving the latter named concern as general manager. He is a graduate of the University of Michigan, class of 1908, and a member of the Tau Beta Pi.

Supervisor of Accident Prevention in Chicago

Victor T. Noonan, who recently resigned as superintendent of accident prevention for the Cleveland Railway, has been appointed supervisor of accident prevention for the Chicago Surface Lines. Mr. Noonan is one of the pioneer accident prevention engineers of the country and has a national reputation in this work. He was remarkably successful in organizing the accident prevention work of the Cleveland Railway. He was formerly State Director of Industrial Safety for Ohio, holding this position, which was nonpolitical, for six years. Previous to his connection with the Cleveland Railway he was a public consulting accident prevention engineer and had organized accident prevention in some of the largest industries in the United States. Mr. Noonan is the author of five motion picture scenarios on accident prevention. He is a member of the National Safety Council and chairman of the committee on public education of the American Street Railway Section of the National Safety Council.

J. B. Mahan Made Secretary and Treasurer at Schenectady

Another change in the executive staff of the Schenectady Railway has become effective in the naming of J. B. Mahan to the position of secretary and treasurer, succeeding J. H. Aitken, who recently resigned after twenty-one years of service with the company. Mr. Mahan for the past six years has been head of the accounting department of the Terre Haute Traction & Light Company and was closely connected with E. M. Walker when the latter was connected in an official capacity with the Terre Haute, Indianapolis & Eastern Traction Company before Mr. Walker was made president of the Schenectady Railway. In all, he served the Terre Haute company approximately ten years. He is a native Indianian. He went to Schenectady on Nov. 10.

Thomas J. Lynch Had Active Railway Career

Thomas J. Lynch, whose appointment as general manager of the Schenectady Railway was noted in the ELECTRIC RAILWAY JOURNAL, issue of Nov. 3, entered upon his railroad career as a clerk in the passenger department of the Delaware & Hudson Company, Albany, N. Y., filling consecutively various positions in the service of that company in the passenger, freight, traffic, mechanical and transportation departments. He was superintendent of the Susquehanna division with offices at Oneonta, N. Y.; superintendent of Greenwich & Johnsonville Railway with offices at Greenwich, N. Y.; general agent with offices in New York City; assistant to the vice-president and general manager; and later became assistant to that company's vice-president in charge of the subsidiary properties, including the Hudson Valley Railway, Plattsburg Traction Company, United Traction Company, and the Champlain Transportation Company. In the last-named position he was detailed to special investigations of operating practices effective on various street railways throughout the country, and had the handling of all purchases. Later he became assistant general manager of the United Traction Company at Troy, N. Y.; and on July 15, 1923, became assistant general manager of the Schenectady Railway. His ability here was soon noted, for in less than four months he was appointed general manager of the Schenectady property, effective Nov. 1.

T. J. Lynch

Mr. Lynch was born at Troy, N. Y., on Jan. 29, 1886. In charge of operation, he succeeds in his new position William S. Hamilton, who was general superintendent.

Francis Tingley, formerly supervisor of overhead lines, Washington Railway & Electric Company, Washington, D. C., has resigned to become a member of the firm of Over & Tingley, to engage in general engineering work in the vicinity of Philadelphia.

J. Alfred Cote has been appointed superintendent of the Quebec Railway, Light, Heat & Power Company. In this position he succeeds J. A. Everell.

C. M. Cheney, vice-president of the Des Moines & Central Iowa Company, Des Moines, Iowa, has been named president and general manager of the Waterloo, Cedar Falls & Northern Railway. He succeeds C. D. and L. S. Cass, who relinquished all their holdings to the bondholders.

D. E. Byerley has been transferred from the Hattiesburg Traction Company, Hattiesburg, Miss., where he served in the capacity of general manager, to Adrian, Mich., to assume the managership of the Lenawee County Gas & Electric Company, a new property purchased by the Doherty Organization. E. E. Armstrong, formerly general superintendent of the Meridian Light & Railway Company, has been transferred to Hattiesburg, filling the position of general manager.

David G. Fisher has resigned as president and director of the Iowa Southern Utilities Company, Centerville, Iowa. He has held the position since 1916, when he organized the corporation with the plants in the vicinity of Leon, Iowa. Mr. Fisher, also president of David G. Fisher & Company, public utility engineers, will devote his time to the development of extensive engineering projects in which he has for some time been interested.

John W. Ryan has resigned as secretary of the Erie County Traction Corporation, Buffalo.

C. M. **Broadhurst**, formerly with the Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont., has been appointed mechanical superintendent of the Toronto Suburban Railway, Toronto. In this capacity he replaces F. Bazett-Jones, who has been transferred to St. Catherines. Both properties are owned by the Canadian National Railways.

T. L. **Beauchamp**, formerly district manager of the Alabama Power Company at Decatur, Ala., is now superintendent of the Tuscaloosa Railway & Utilities Company at Tuscaloosa, Ala. The Alabama Power Company recently took control of the railway property.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Volume of Business in Car Building Industry Doubled Since 1909

Although the total number of persons engaged in the business of building electric railway cars was less in 1921 than in 1909, according to figures recently released by the Department of Commerce, nevertheless the total value of the product was nearly double that of the earlier year. The decrease in the number of employees was entirely among the wage earners. The number of salaried workers, on the other hand, showed a marked gain. Moreover, the total sum paid in salaries has steadily advanced, the increase being 43.7 per cent from 1909 to 1919 and 33.2 per cent from 1919 to 1921. Wages increased in the first period, but in the latter two years decreased 22.6 per cent.

Since 1909 the value of the manufactured product has about doubled. The cost of materials was in 1919 nearly triple what it had been ten years earlier, but since that time there has been some reduction. General statistics for the electric railway car building industry are given in the accompanying table.

	1921	1919	1914	1909	Per Cent of Increase or Decrease 1919–1921	 1909–1919
Number of establishments	10	7	14	14	....	....
Persons engaged	3,356	3,285	4,286	4,004	2.2	—18.0
Salaried employees	444	365	446	421	21.6	—13.3
Wage earners (average number)	2,912	2,920	3,840	3,583	— 0.3	—18.5
Salaries and wages	$4,334,934	$4,984,941	$3,199,674	$2,770,566	—13.0	79.9
Salaries	1,135,789	852,851	732,647	593,617	33.2	43.7
Wages	3,199,145	4,132,090	2,467,027	2,176,949	—22.6	89.8
Paid for contract work	....	....	129,904	233,508	....	....
Cost of materials	7,880,405	12,058,942	6,349,779	4,260,470	—34.7	183.0
Value of products	14,856,068	18,441,976	10,494,953	7,809,866	—19.4	136.1
Value added by manufacture	6,975,663	6,383,034	4,145,174	3,549,396	9.3	79.8

Barney & Smith Plant Again on Sale

Under an order issued at Dayton by Judge Edward T. Snediker of the Montgomery County Common Pleas Court the Barney & Smith Car Company's plant will again be offered for sale Dec. 5. It is reported that a prospective buyer has been found. The Baltimore & Ohio Railroad is mentioned as the possible bidder. The plant must sell for two-thirds of the appraised value. In successive reappraisals the value set on the plant has been reduced from $3,257,759 to $1,423,839, its present appraisal value. A bid of $949,226 may legally be accepted. As representative of the holders of $2,000,000 in mortage bonds against the company, the Guaranty Trust Company, New York, is requesting the sale at this time. If the plant is not sold it will probably be reappraised and the valuation still further reduced. The last attempt to sell the car company was on April 2, 1923, when the entire plant and equipment were offered at the present valuation.

Large Shipments Made to Chile

Several unusually large shipments of substation equipment and rolling stock for the Chilean State Railway have been made from the Westinghouse plant at East Pittsburgh. One consignment consisted of six freight locomotives completely crated and packed for the ocean voyage. This was claimed to be the largest single shipment of the kind ever made. Another, consisting of complete equipment for three substations, required for overland transportation thirty-three railroad cars. The aggregate weight amounted to more than 800 tons, and the total value of the equipment was about $750,000. An interesting feature of this shipment was the fact that the long train, drawn by an electric locomotive, was started by wireless. These consignments are part of a $7,000,000 order now nearing completion.

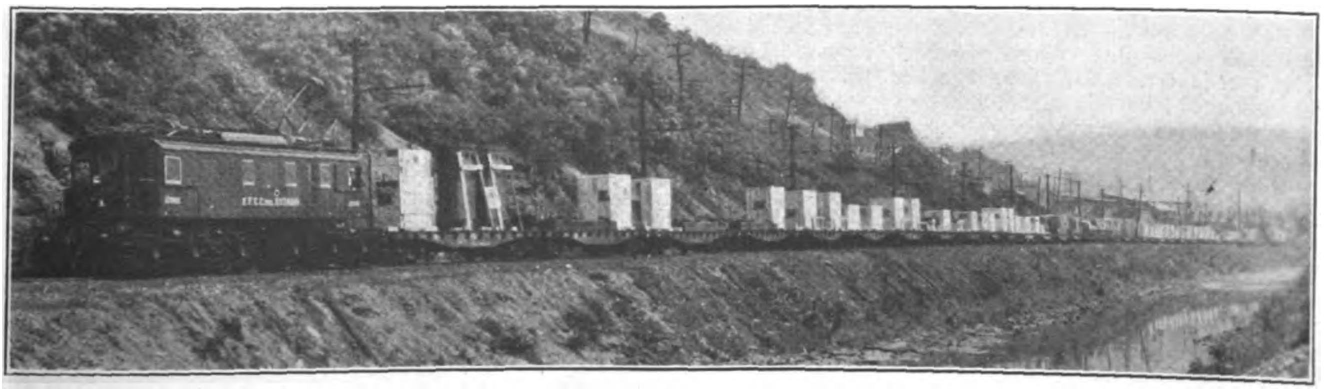
Costs Higher on Supplies Manufactured in Railway Shops

One of the larger railways, which had undertaken to manufacture a number of things in its own shops, such as axle and armature bearings, cast-iron brake shoe hangers, door and step mechanisms and other regularly used maintenance supplies, recently checked its costs against the prices of manufacturers for these same articles. This company had found that it had to add 97 per cent to the prime cost of labor and material to cover its overhead expense. Upon submitting specifications on twelve articles, as manufactured in the company's shops, to several manufacturers, the bids received were lower in every case than the company's costs, a fairly sizable quantity having been specified. Needless to say, the company ceased manufacture in its own shops.

The superintendent of equipment said his shop was supplied with machine tools and handling equipment rather better than the average railway shop. The difficulty is that the average shop is equipped with utility tools, which are maintenance tools and not manufacturing tools. A manufacturing plant is supplied with high-speed tools, and the work is organized and the employees are particularly trained in production work. As soon as a manufacturing program is put into the maintenance plant, it takes the mind of the master mechanic off maintenance and onto manufacturing. This equipment man remarks that the two kinds of shop work simply will not mix, and the railway nearly always makes a mistake in trying to manufacture its own supply parts.

Metal, Coal and Material Prices

Metals—New York	Nov. 7, 1923
Copper, electrolytic, cents per lb.	12.687
Copper wire base, cents per lb.	15.00
Lead, cents per lb.	6.75
Zinc, cents per lb.	6.70
Tin, Straits, cents per lb.	43.50
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.40
Somerset mine run, Boston, net tons	2.275
Pittsburgh mine run, Pittsburgh, net tons	1.925
Franklin, Ill., screenings, Chicago, net tons	1.45
Central, Ill., screenings, Chicago, net tons	1.05
Kansas screenings, Kansas City, net tons	2.25
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$6.60
Weatherproof wire base, N. Y., cents per lb.	18.00
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N. Y., per gal.	$0.93
White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots	11.25
Turpentine, (bbl. lots), N. Y., per gal.	$0.96



This Thirty-three-Car Train Carrying Electrical Equipment for the Chilean State Railway Was Started from East Pittsburgh by Wireless

British and Foreign Prices for Electric Plant

The municipalities of both Leeds and Bradford have appointed committees to consider the fact that the tenders of British firms for electric plants are higher than those of firms on the continent of Europe. The desire of the city councils of course is to give their orders to British firms, and it is hoped to find some way by which the great disparity of prices may be removed. In the meantime, the electricity committees of both towns have accepted tenders from British firms for the supply of large turbo-generators.

London Electric Railway Extension

The first section, about 1½ miles long, of the extension of the Charing Cross & Hampstead Railway from Golder's Green to Hendon is now practically complete. Work is proceeding rapidly on the second section, 3 miles long, from Hendon to Edgware. The extension is mostly on the surface, but there are some tunnels. This work began ten months ago and is well advanced. The total cost of the section from Endon to Edgware, including permanent way, signaling, station buildings, rolling stock, and other works, will be £398,000.

Rolling Stock

Schenectady Railway has ordered one double-truck snow plow, delivery on which will be expected by Nov. 15. The company has overhauled and repaired six sweepers to provide adequate snow removal equipment for the coming winter.

Kansas City Railways, Kansas City, Mo., during the last month has remodeled 190 cars in use on city lines to conform to the safety standards that have been adopted by that company. All the cars have been equipped with automatically closing doors and steps, which are designed to avert accidents and handle the traffic more expeditiously.

Track and Line

San Antonio Public Service Company has been authorized by the City Commission to build an extension on Rulz Street, at an estimated cost of $24,000.

New York, N. Y.—The Board of Estimate has approved the Transit Commission's request for $1,725,000 for the extension of the Brooklyn-Manhattan Transit Corporation subway in Fourth Avenue, Brooklyn, to Fort Hamilton.

Honolulu Rapid Transit Company has adopted plans for extensions and improvements to its system involving an expenditure of more than $300,000, according to H. Stuart Johnson, manager. The residential districts of the city are expanding rapidly and it is stated that the company will make provision for caring for this traffic more adequately than at present.

New York State Railways, Syracuse, N. Y., has been authorized by the Public Service Commission to extend its line on the Syracuse-Bridgeport highway a distance about 2,000 ft. so as to provide transportation service for employees of an industry soon to be operated in Salina. There was no opposition to the company's petition to exercise a franchise in that town and the commission holds the additional tracks are necessary and convenient for the public.

Muskegon Traction & Lighting Company has been granted permission to make an extension of 1 mile from its present Ottawa Street car line to Getty Avenue.

Columbus Railway, Light & Power Company, Columbus, Ohio, following the court award of $1,136,310, announced through President Kurtz that there were many improvements and new construction projects that should be carried out. New cars are needed, as the present equipment is not sufficient. The construction of an additional power plant costing approximately $4,000,000 is contemplated. Extension of car lines into newly built-up property, street improvements, placing of power lines underground and scores of other things must be undertaken in the near future.

Power Houses, Shops and Buildings

Fort Dodge, Des Moines & Southern Railroad, Boone, Iowa, has awarded the contract for the construction of a new brick and concrete carhouse and yard office at Fort Dodge, at a cost of $150,000, to the W. J. Zitterell Construction Company, Des Moines. The old building, which the concrete is to replace, was recently destroyed by fire.

Olean, Bradford & Salamanca Railway, Olean, N. Y., will use power from Niagara Falls on part of its lines beginning early in December. The system is expected to draw its entire supply of power from the Falls next spring. With the completion of the power system now being installed the Ceres plant is to be closed down, but held as an auxiliary source of power for use in emergency.

Louisville, Ky.—Plans and specifications for the new interurban terminal station for the Louisville Railway Company on the west side of Second Street, between Liberty and Walnut Streets will be mailed out to contractors shortly and bids will be opened and considered about Dec. 1. The estimated cost is $200,000. The announcement of the bids was recently made by Frank H. Miller, vice-president in charge of engineering and construction for the company.

Tri-City Railway of Illinois will lay 1,500 ft. of track on vacant property at Thirty-fifth Street and Fifth Avenue, Rock Island, where cars from the East Moline division will be stored. The project will cost approximately $10,000, Frank Skelley, assistant manager of the railway, announced. The cars will be stored on the company's lot on Thirty-fifth Street until such time as a new carhouse is constructed in Moline. The cars were formerly stored in the carhouse at the foot of Sixteenth Street, Moline.

Trade Notes

The General Railway Signal Company of New York City has filed an amended certificate of incorporation in the office of the Secretary of State at Albany increasing its capital from $10,000,000 to $10,500,000. Harris, Beach, Harris & Matson of Rochester, N. Y., are attorneys for the corporation.

Industrial-Utilities Service Bureau is now located at Suite 77, Todd Building, Louisville. A. R. McLean is the principal of the bureau.

Hitchcock & Tinkler, Inc., contractors building the 6-mile Moffat tunnel in Colorado, have ordered from the General Electric Company six electric locomotives, to be used in hauling the debris from the tunnel. When the tunnel is completed larger electrical locomotives will be used.

General Electric Company, Schenectady, N. Y., announces important rearrangements of certain fields of work within the sales branch involving a change of name of two departments. What has hitherto been known as the lighting department becomes the central station department, and the name of the power and mining department is changed to industrial department.

Transit Equipment Company, New York, N. Y., recently announced through its president, R. W. Marshall, that it would carry a complete line of new and used buses, bus bodies, fare-registering devices and bus accessories, selling exclusively to the electric railway industry. V. C. Ealey is in charge of this branch of the company's business.

New Advertising Literature

American Di-Electrics, Ltd., Brooklyn, N. Y., has issued a pamphlet, describing briefly its principal products, entitled "Electrical Insulation made by Electrical Engineers." This is also known as Price List 123.

Foamite-Childs Corporation, Utica, N. Y., issues the "Industrial Fire Chief" "in the interest of fire protection engineering."

National Tube Company, Pittsburgh, Pa., has issued the "Seven Wonders of Wrought Pipe." With the aid of pictures and descriptive matter the importance of each wonder is shown in its relation to industry as the "seven wonders of the world" are of importance to science and literature.

The Thermal Syndicate, Ltd., New York, N. Y., has issued a 16-page pamphlet on Vitreosil data.

The big

idea

on the subject of chain winding capacity

Why do you suppose we keep harping on this "chain winding capacity" business?

It's because so often we have been unable to impress the importance of the subject on railway executives, until some unfortunate accident has occurred on their own roads to show them the light.

PEACOCK STAFFLESS BRAKES

can wind up yards of brake chain

Neither slack nor worn brake shoes can prevent effective braking, because there is almost no limit to the length of chain which can be wound in with the Peacock Staffles. Where the ordinary hand-brakes may jam after a few turns, this equipment will take up chain until the brakes take hold.

Peacock Staffles Brakes have a demonstrated capacity for winding in 144 inches of chain. Try your hand brakes and see what they will do!

National Brake Company, 890 Ellicott Square, Buffalo, N. Y.

Canadian Representative
Lyman Tube & Supply Co., Ltd., Montreal, Can.

Bankers and Engineers

Ford, Bacon & Davis
Incorporated
Engineers
115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

STONE & WEBSTER
Incorporated
EXAMINATIONS REPORTS APPRAISALS
ON
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES
NEW YORK BOSTON CHICAGO

SANDERSON & PORTER
ENGINEERS
REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS
RAILWAY, LIGHT and POWER PROPERTIES
CHICAGO NEW YORK SAN FRANCISCO

THE ARNOLD COMPANY
ENGINEERS—CONSTRUCTORS
ELECTRICAL—CIVIL—MECHANICAL
105 South La Salle Street
CHICAGO

ALBERT S. RICHEY
ELECTRIC RAILWAY ENGINEER
WORCESTER, MASSACHUSETTS
REPORTS—APPRAISALS—RATES—OPERATION—SERVICE

STEVENS & WOOD, INC.
Design and Construction of Power Stations
Railroad Electrification, Industrial Plants
REPORTS AND APPRAISALS
Management and Financing of Utilities and Industrials
Youngstown New York

HEMPHILL & WELLS
CONSULTING ENGINEERS
Gardner F. Wells Albert W. Hemphill
APPRAISALS
INVESTIGATIONS COVERING
Reorganization Management Operation Construction
43 Cedar Street, New York City

WALTER JACKSON
Consultant on Fares, Buses, Motor Trucks
Originator of unlimited ride, transferable weekly pass. Campaigns handled to make it a success.
143 Crary Ave., Mt. Vernon, N. Y.

THE J. G. WHITE
ENGINEERING CORPORATION
Engineers—Constructors
Industrial Plants, Buildings, Steam Power Plants, Water Powers, Gas Plants, Steam and Electric Railroads, Transmission Systems
43 Exchange Place, New York

JOHN A. BEELER
Operating, Traction and Traffic Investigations
Routing Surveys—Valuations—Operation
Management
52 Vanderbilt Ave., NEW YORK

ENGELHARDT W. HOLST
Consulting Engineer
Appraisals, Reports, Rates, Service Investigation, Studies on Financial and Physical Rehabilitation Reorganization, Operation, Management
683 Atlantic Ave., Boston, Mass.

J. ROWLAND BIBBINS
Engineer—921 Fifteenth St., WASHINGTON, D. C.
TRANSPORTATION
Complete Transit Surveys and Development Programs, adapting Motor-Transport, R.R. Terminal and City Plans. Traffic, Service, Routing, Operation and Valuation. EXPERIENCE IN 20 CITIES

JOE R. ONG
Consulting Transportation Engineer
Specializing in Traffic Problems and in Methods to Improve Service and Increase Efficiency of Operation
PIQUA, OHIO

Parsons, Klapp, Brinckerhoff & Douglas
WM. BARCLAY PARSONS H. M. BRINKERHOFF
EUGENE KLAPP W. J. DOUGLAS
Engineers—Constructors—Managers
Hydro-electric Railway Light and Industrial Plants
Appraisals and Reports
CLEVELAND NEW YORK
1570 Hanna Bldg. 84 Pine St.

DAY & ZIMMERMANN, INC.
ENGINEERS
Design, Construction
Reports, Valuations, Management
NEW YORK PHILADELPHIA CHICAGO

The Most Successful Men in the Electric Railway Industry read the
ELECTRIC RAILWAY JOURNAL
Every Week

EDWIN WORTHAM, E.E.
Consulting Engineer
Valuations of Electric Railways and
Utilities of All Kinds
Traffic and Operating Studies
Allison Bldg. **Richmond, Va.**
Established Feb. 1913.

C. B. BUCHANAN President W. H. PRICE, JR. Sec'y-Treas. JOHN F. LAYNG Vice-President
BUCHANAN & LAYNG CORPORATION
Engineering and Management, Construction,
Financial Reports, Traffic Surveys
and Equipment Maintenance
BALTIMORE
825 Equitable Bldg.
Phone:
Hanover 2142
NEW YORK
49 Wall Street

JAMES E. ALLISON & CO.
Consulting Engineers
Specializing in Utility Rate Cases and
Reports to Bankers and Investors
1017 Olive St., St. Louis, Mo.

KELLY, COOKE & COMPANY
Engineers
149 BROADWAY
NEW YORK
424 CHESTNUT STREET
PHILADELPHIA

Transmission Line and Special Crossing
Structures, Catenary Bridges
WRITE FOR OUR NEW DESCRIPTIVE CATALOG
ARCHBOLD-BRADY CO.
Engineers and Contractors SYRACUSE, N. Y.

The Most Successful Men in the Electric Railway
Industry read the
ELECTRIC RAILWAY JOURNAL
Every Week

THE P. EDWARD WISH SERVICE
50 Church St.
NEW YORK
Street Railway Inspection
DETECTIVES
131 State St.
BOSTON

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

WHEN RAILWAY MEN

in general, study the question of *wood durability* for other purposes, as carefully as *Railway Signal* men have studied it for *Trunking* and *Capping,* there will be a lot more

"ALL-HEART"
"TIDEWATER"
CYPRESS
"THE WOOD ETERNAL"

used for *Fencing, Ties, Car Material, Station Construction* and similar railroad requirements, *to the very great economy of the companies using it.*

The long service which *"All-Heart" Cypress* gives,

SAVES LABOR COSTS
FOR RENEWALS AND
REPLACEMENTS

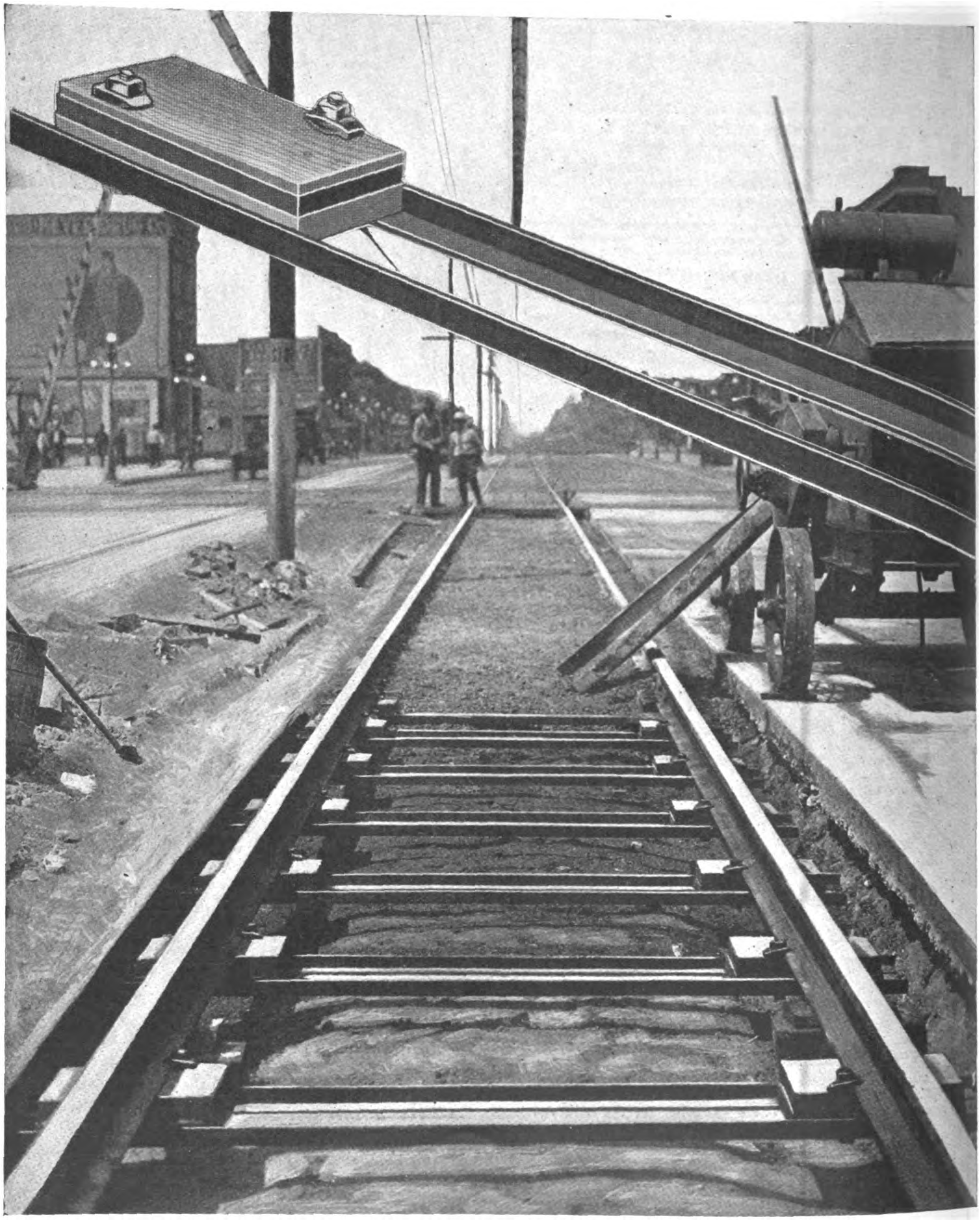
—big items in themselves.

"All-Heart" Cypress comes nearer being decay proof than any other wood.

This mark on every timber, board and bundle of Cypress is your *insurance of true replacement economy.*

The data in support of these facts will be promptly furnished upon request.

SOUTHERN CYPRESS MFRS.' ASSN
12 5 Poydras Building, New Orleans, La., or
1265 Graham Building, Jacksonville, Fla.

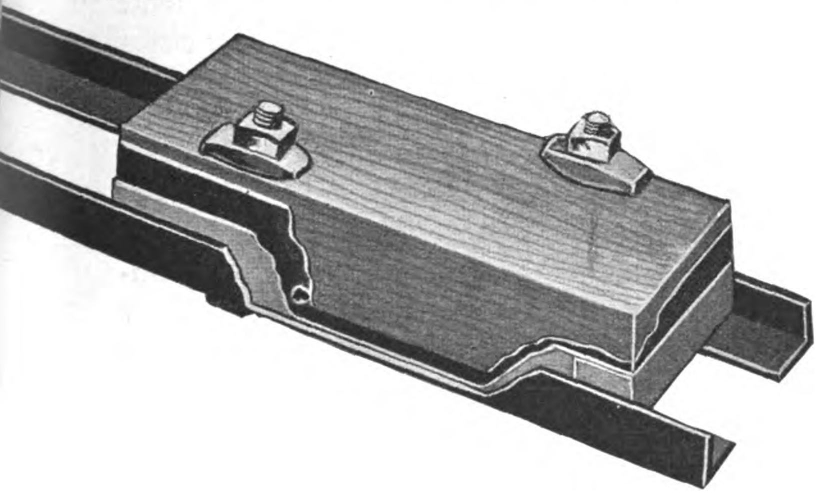


DAYTON

They did not believe they could save $6,000 per mile

—but experience proved that our claim is based on fact

The first cost of track laid on Dayton Resilient Tis is $6,000 per mile cheaper than that laid on wood ties on concrete foundation and $2,000 per mile cheaper than that laid on wood ties on gravel ballast.



RESILIENT TIES will enable you to build more *track* and *better* track for the same money — or the same amount of track for far *less* money.

Consider the saving of $6,000 per mile in concrete roadbed. Considerable. Yet there are reliable figures from Resilient Tie jobs in many parts of the country which supply evidence that this saving has actually been accomplished time and again.

But the mere fact that Resilient Tie jobs *cost less* is not enough. You may also have absolute assurance that Resilient Ties actually provide *better* track than wood ties. Accurate statistics show that not only is maintenance cost greatly reduced, but that the *resiliency* of these modern ties effects a considerable saving in repairs on rolling stock — with less jarring there is less wear, and less wear means longer-lived cars and reduced costs.

te today
ctual cost figures
Resilient Tie Track Construction

THE DAYTON
MECHANICAL TIE CO.
706 Commercial Building, Dayton, Ohio

Canadian Representative:
Lyman Tube and Supply Co., Ltd., Montreal, Quebec

Resilient
TIE

— saves first cost !
— saves maintenance !
— saves rolling stock !

Promoting Co-operation and Fair Competition

A B P Standard No. 8

"To CO-OPERATE with all organizations and individuals engaged in creative advertising work."

THE distance between buyer and seller must be shortened; the road-way which leads from producer to the final consumer must be made straight, broad and smooth; the cost of distribution must be reduced—that is why we pledge ourselves to co-operate with all others engaged in creative advertising work.

We believe that advertising is an economic force, a piece of improved sales machinery which, properly employed, becomes a boon to business and society.

So we ARE co-operating in every movement that will put advertising on a higher plane and make it more efficient. Recently we conducted in the larger cities a 6-months course in Publishing and Advertising which was attended by over 1000 employees of our various papers, and for which the students paid over $60,000.00.

As an organization we are active members of The Associated Advertising Clubs of the World, Chamber of Commerce of U. S. A., and of the Audit Bureau of Circulations. Our members are solidly behind every movement for better merchandising and better selling.

A B P Standard No. 9

"To avoid unfair competition."

FAIR-PLAY is ingrained in the American character, and it is one of the practical working standards of The A B P, Inc. It is enforced, too—if someone's foot slips a little, he is brought back into line with kindly but insistent firmness.

Concretely, our idea of fair competition is to see who can build the most, not who can tear down the most, but this involves no easy tolerance of evil practices, whether in publishing or the fields we serve.

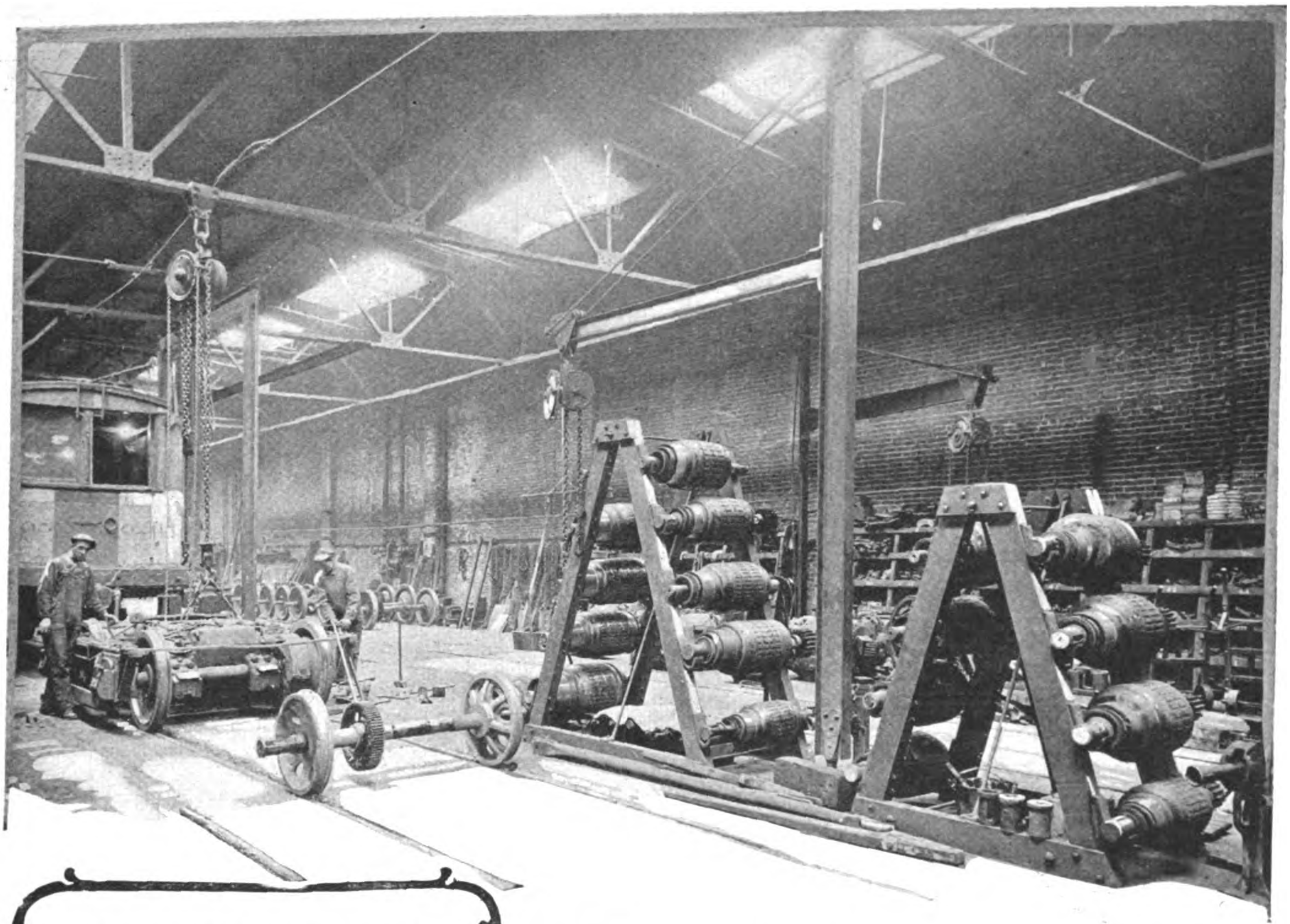
If you have read the preceding advertisements in this series, you will begin to understand that the A B P papers are of superior merit, because they are built upon the solid rock of right principles.

THE ASSOCIATED BUSINESS PAPERS, INC.

JESSE H. NEAL, *Executive Secretary*

HEADQUARTERS: 220 WEST 42nd STREET NEW YORK CITY

The ELECTRIC RAILWAY JOURNAL *is a Member of the A. B. P., Inc.*



IRVINGTON
Products

- Varnished Silk
- Varnished Paper
- Black and Yellow Varnished Cambric
- Straight and Bias Varnished Cambric Tapes
- Flexible Varnished Tubing
- Special Folded Paper for Coil Windings
- Transformer Leads
- "Cellulak"
- Special Adhesive
- High Dielectric Paper
- Insulating Varnishes and Compounds
- "Irv-O-Slot" Insulation

Seven factors of Quality

- High Dielectric Strength
- High Resistance
- Flexibility
- Non Hygroscopic
- Heat Resisting
- Chemically Neutral
- Maximum Elasticity

There is time before snow flies to fix up your motors

Don't risk any pull-ins this winter on motors that can be placed in weather-proof condition at a small expense.

Old armature coils replaced here and there; a few new field coils and a good cleaning, dipping and baking will put your motors in good shape before the snow flies.

Just follow the Irvington Specification. 1. Irv-O-Slot for the slots. 2. Irvington Seamless Bias Tape for the coils. 3. Motor Parts, Rotors, Stators, Fields, Armatures, impregnated with Irvington Insulating Varnishes and Enamels.

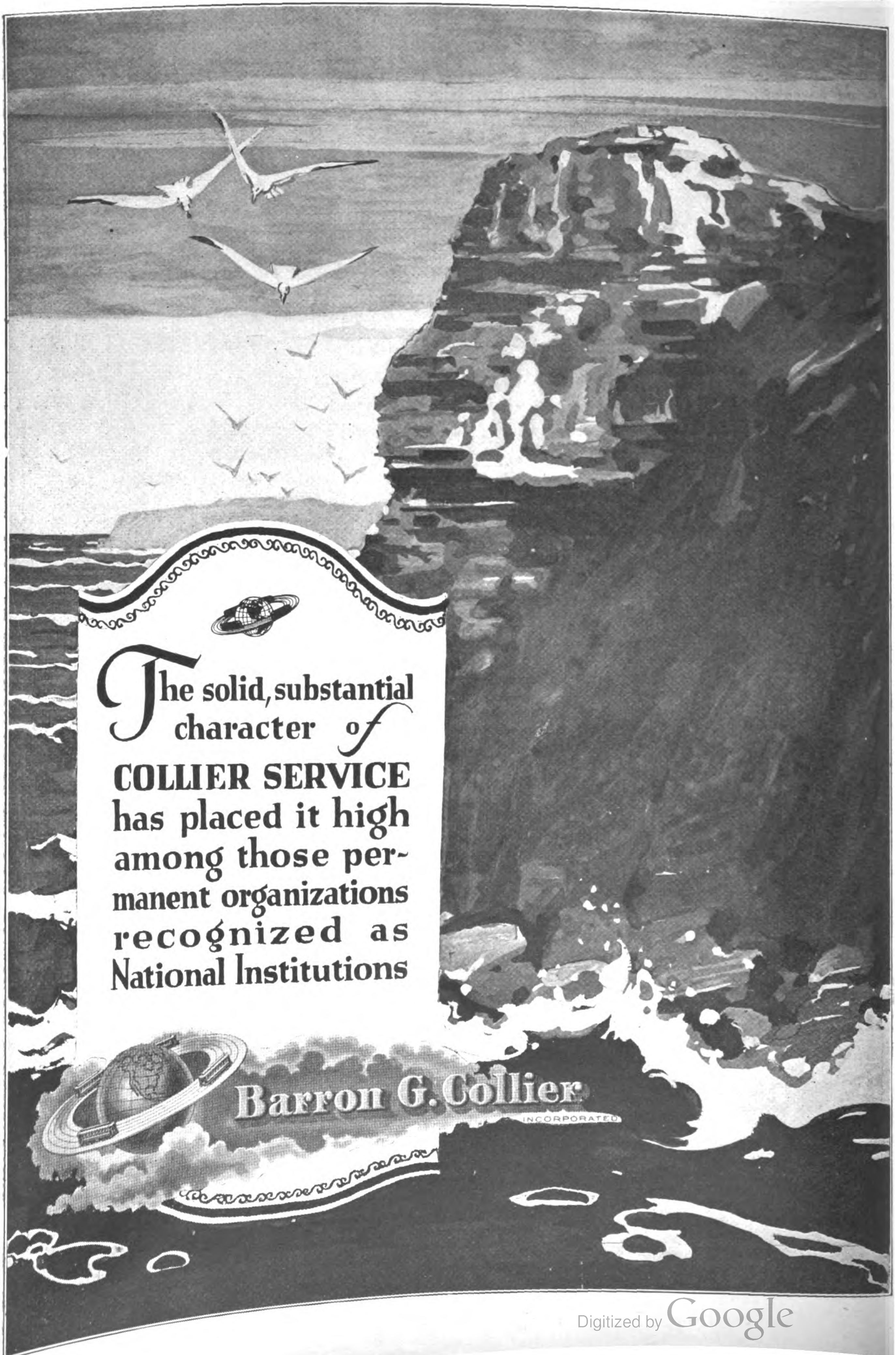
No hardship on your men in the shop. No large expense and yet you'll stop the needless pull-ins. Place your order today.

IRVINGTON VARNISH & INSULATOR Co.
Irvington, New Jersey.

Established 1905

Sales Representatives:

Mitchell-Rand Mfg. Co., New York
T. C. White Electrical Supply Co., St. Louis
E. M. Wolcott, Rochester
F. G. Scofield, Toronto
L. L. Fleig & Co., Chicago
Consumers Rubber Co., Cleveland
Clapp & Lamoree, Los Angeles and San Francisco



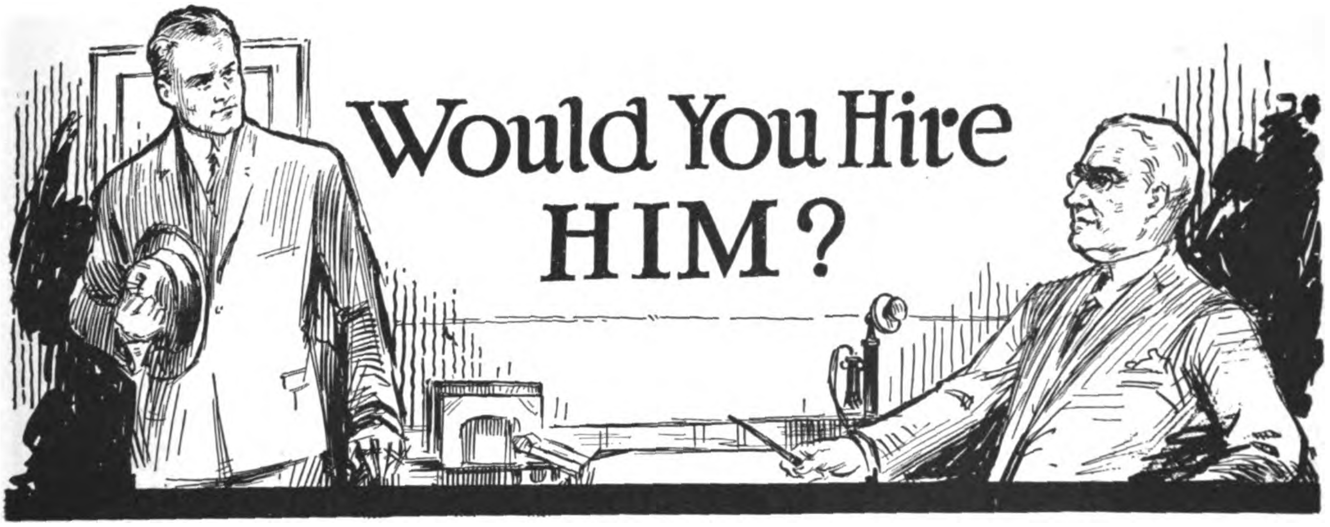
The solid, substantial character of

COLLIER SERVICE

has placed it high among those permanent organizations recognized as National Institutions

Barron G. Collier

INCORPORATED



Would You Hire HIM?

SUPPOSE a man with references from some of the best known companies in the United States asked for an interview so that he could show you how he could stimulate production, eliminate discord and create goodwill in your organization. You would give him the time to outline his proposition; you would doubtless employ him, and feel fortunate in securing his services.

We have a plan to minimize discord, promote goodwill, and stimulate production, which we would like to present to you. This plan has been endorsed by 5,000 well-known employers, some big, some small, some moderate in size. It is time-tried and result-tested. It is now giving satisfaction in factories, in stores, on railroads, and in other business organizations. Put it to work in your organization and it will:

Better the relationship between you and your employees and make the adjustment of difficulties easier.

Increase the loyalty of your workers and make a good working force a better one.

Pay from $500 to $5,000 (depending upon the plan you adopt, and the employee's length of service) to the family of any worker who dies.

Provide insurance protection for the families of those workers, who, on account of their physical condition, are unable to buy life insurance.

Attract new workers, and reduce the turnover in your present working force.

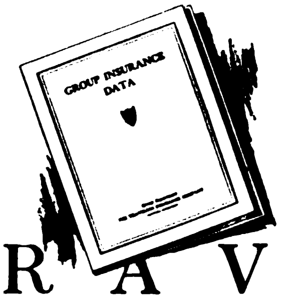
Pay for itself by stimulating production and eliminating waste.

A few of the 5,000 employers using this plan, carrying Group Insurance are: Maryland Refining Company, Washburn-Crosby Company, Lehigh Valley Railroad, The Victor Talking Machine Company, American Bosch Magneto Corporation, Grinnell Company, The Yale & Towne Company.

The cost of this plan is approximately 25 cents per employee per week—about one per cent of payroll.

This portfolio, giving a comprehensive, yet brief exposition of Group Insurance, has been prepared for executives.

THE TRAVELERS INSURANCE COMPANY
Hartford



Send for your copy today. Have your stenographer write on your business letter-head. Your request will not obligate you in any way.

THE TRAVELERS INDEMNITY COMPANY
Connecticut

THE TRAVELERS

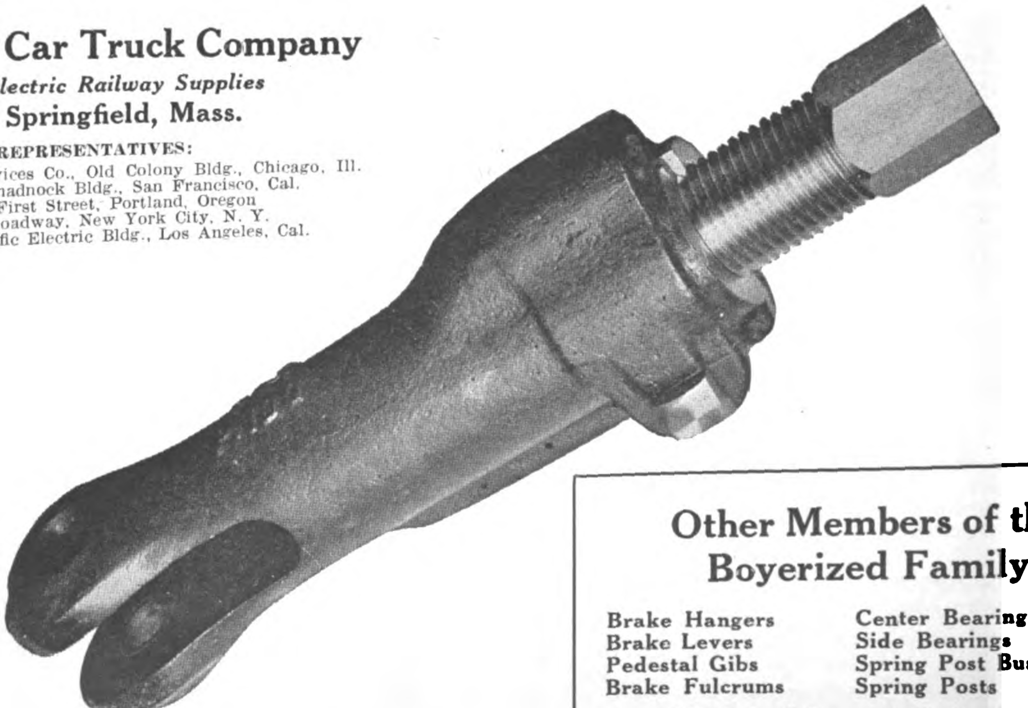
ACCIDENT, LIFE LIABILITY, HEALTH, AUTOMOBILE, STEAM BOILER, COMPENSATION, GROUP, BURGLARY, PLATE GLASS, AIRCRAFT, MACHINERY

Why pay more?

BECAUSE the little more you pay for BOYERIZED parts is really less in the long run. Figure the *final cost* advantage of parts that wear *three to four times longer.* Then realize that BOYERIZED parts have proven conclusively that they possess this extra wear resistance. BOYERIZING gives a glossy armorplate surface that's hard as flint glass, without impairing the toughness of the centre steel.

The McArthur Turnbuckle, illustrated, is but one of the BOYERIZED Family. It requires only a small hand wrench to get a grip that "stays put." One full tooth exposed at the end of each section acts as a cutter in removing ice or caked mud.

The McArthur Turnbuckle



BOYERIZE!

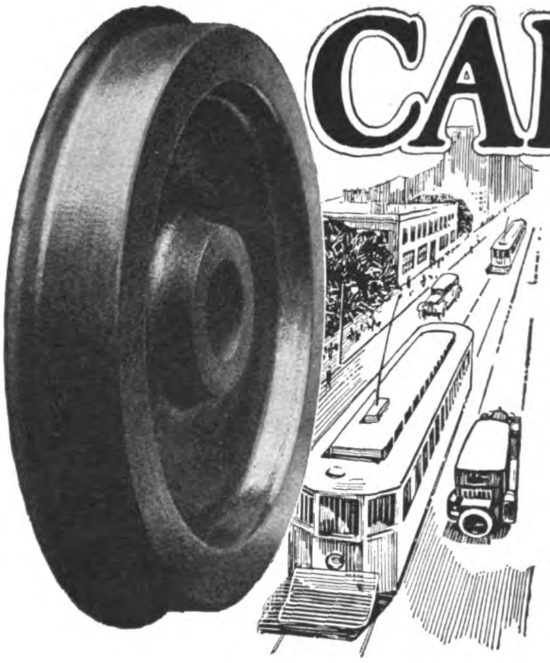
Bemis Car Truck Company
Electric Railway Supplies
Springfield, Mass.

REPRESENTATIVES:
Economy Electric Devices Co., Old Colony Bldg., Chicago, Ill.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKenney, 54 First Street, Portland, Oregon
J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.

Other Members of the Boyerized Family

- Brake Hangers
- Brake Levers
- Pedestal Gibs
- Brake Fulcrums
- Center Bearings
- Side Bearings
- Spring Post Bushings
- Spring Posts

Bolster and Transom Chafing Plates



CARNEGIE

—the name
that assures Quality
to Users of Wheels

CARNEGIE
Wrought Steel
WHEELS

And why 'Wrought Steel'?

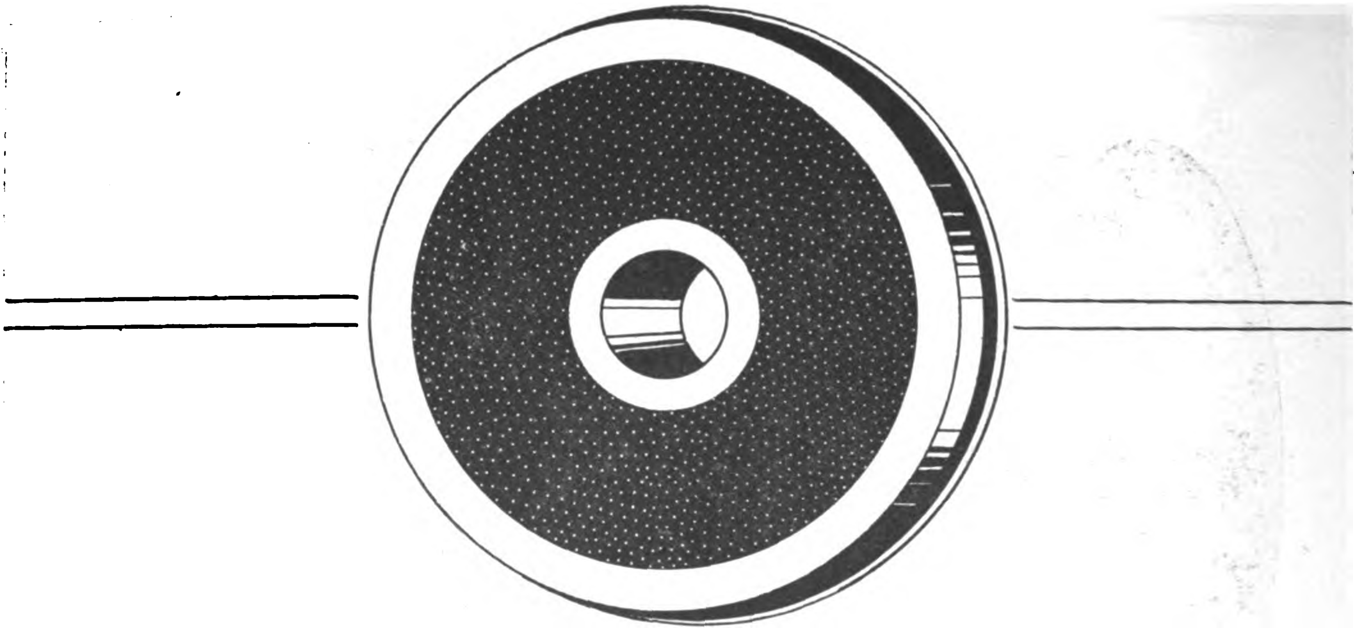
Because, in the special process of manufacture, the steel is hydraulically forged under enormous pressure and then rolled. There is no possibility of sand spots, blow holes and other irregularities that cause breakage. The wheel is homogeneous in structure—and can be worn to the limit. This thorough preparation of the steel explains why Carnegie Wheels meet so satisfactorily the heavy demands of modern traffic.

The wheels that are Safe—the wheels that are Economical because of long service—you can get them by specifying Carnegie Wrought Steel Wheels.

Carnegie Steel Company

GENERAL OFFICES: CARNEGIE BUILDING 434 FIFTH AVENUE PITTSBURGH, PA.

1652



ROLLED STEEL WHEELS

Standard Steel Works Company produces driving and trailer wheels of the highest quality. We commenced the manufacture of rolled steel wheels in 1904. Our long experience is built into every wheel.

"Not only to make better products but to make them better understood—not only to sell but to serve, assisting those who buy to choose as well as use their purchases—this is the privilege, if not the practice of all modern manufacturers."—Vauclain.

STANDARD STEEL WORKS COMPANY

PHILADELPHIA, PA.

BRANCH OFFICES

CHICAGO
ST. LOUIS

HOUSTON, TEXAS
PORTLAND, ORE.

RICHMOND, VA.
SAN FRANCISCO
NEW YORK

BOSTON
ST. PAUL, MINN.

PITTSBURG, PA.
MEXICO CITY, MEX.

WORKS: BURNHAM, PA.

Right After the Whistle Blows—

NEW YORK STATE RAILWAYS
ROCHESTER LINES
ONE 7¢ FARE
965000

How many hundreds of people are depending on your lines to carry them to their homes? How many of them crowd into your cars?

They are in a hurry. They want speed and service! Do they get it?

Globe Tickets and P. M. Coupon Transfers are helping many Electric Railway Operators to give patrons service at times like these.

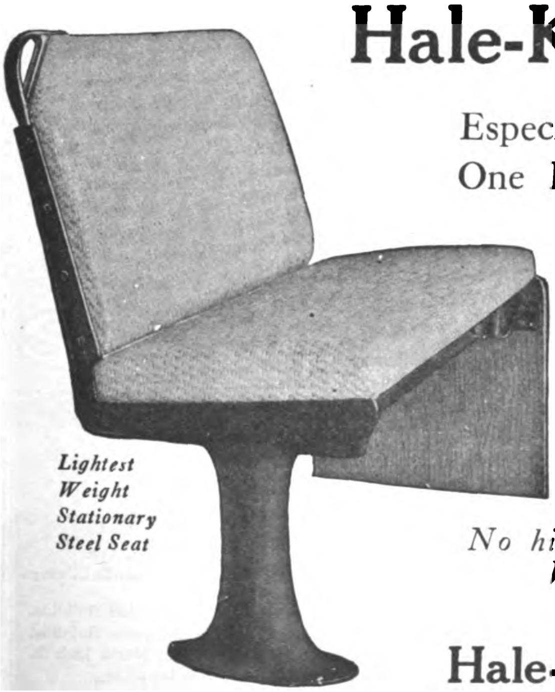
Nearly half a century of real experience in making tickets gives us the confidence to say that Globe Tickets will help you.

A word to the wise is sufficient. You can profit by all of our experience, if you will let us help you solve your ticket problems.

Globe Ticket Company, 116 N. 12th Street, Philadelphia, Pa.
Los Angeles New York San Francisco

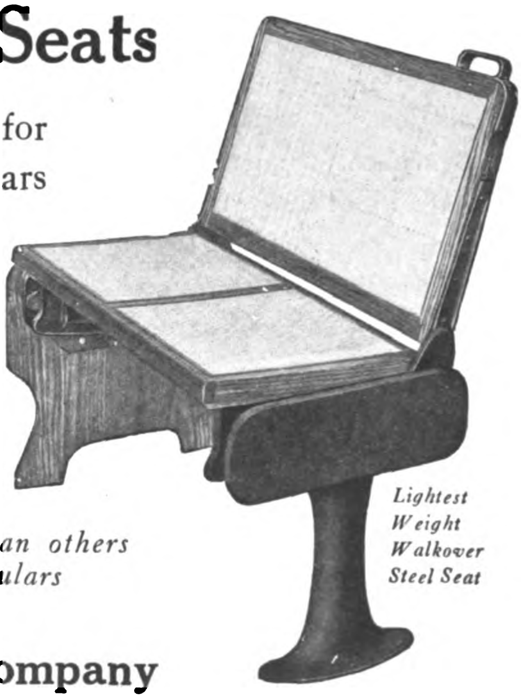
Your Passengers Will Enjoy Their Ride On
Hale-Kilburn Seats

Especially Designed for
One Man Safety Cars



Lightest Weight Stationary Steel Seat

Lightest
Strongest
Simplest
Neatest



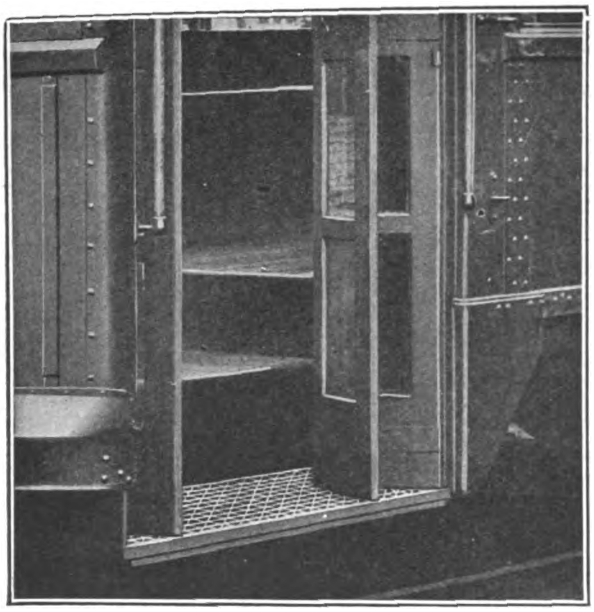
Lightest Weight Walkover Steel Seat

No higher in price than others
Write for particulars

Hale-Kilburn Company
PHILADELPHIA

New York 30 Church St.	Chicago McCormick Bldg.	Richmond Mutual Bldg.	Atlanta Candler Bldg.	San Francisco 71 First St.	Los Angeles 447 E. 3rd St.

IRVING SUBWAY
THE FIREPROOF VENTILATING FLOORING



TRADE MARK
IRVING SAFSTEP
(PATENTED) REG. U.S. PAT. OFF.
ABSOLUTELY NON-SLIPPING ALWAYS

Safety—always and under all weather conditions—is the big outstanding feature of this all-steel car step. It's permanently non-slipping surface is an in-built feature—not secured by mats that will wear and work loose, or abrasive insets that will lose their effectiveness and become a menace. And the life of the **Safstep** is the life of steel—there is no maintenance upon it. There is a size to meet any railway requirement, and the first cost is the last cost. Write for Catalog 4A-28.

IRVING IRON WORKS CO.
LONG ISLAND CITY. N.Y.. U.S.A.

MANUFACTURERS OF

TRADE MARK
IRVING SUBWAY
(PATENTED) REG. U.S. PAT. OFF.
THE FIREPROOF VENTILATING FLOORING

Selwa

Selwa is the large hole in the ground that the Kaffir digs as a storehouse for his grain, etc. The entrance is covered with grasses so that raiders will have a hard time finding the hiding place.

Our artist has deftly depicted an unthinking person, just above such a storehouse and registering bewilderment.

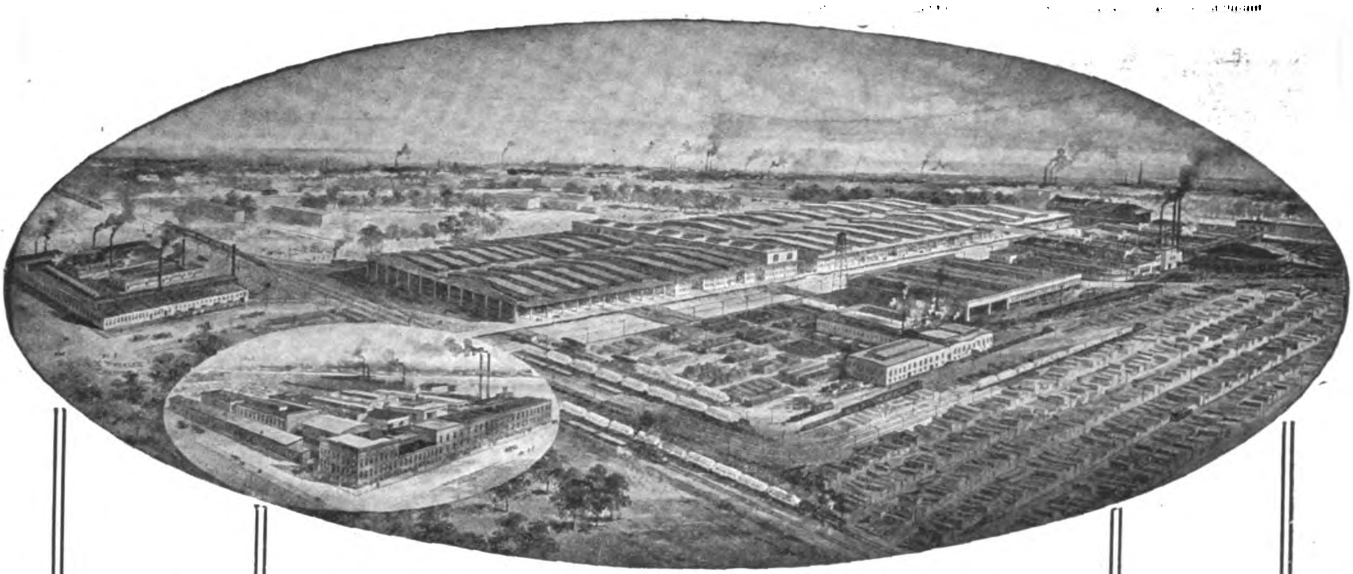
And the title to the picture reads "Get below the surface when you want what you want." If you're bewildered on commutation—get below the subjoined Morganite trademark (just about an inch due south of here), and you'll find the name of a brush engineer who will dig below surface appearances and prescribe the right Morganite brush to make operators feel that after all, perhaps life is worth while.

Morganite Brush Co., Inc

***Main Office and Factory*:**
519 West 38th St., New York

DISTRICT ENGINEERS AND AGENTS:

Pittsburgh, Electrical Engineering & Mfg. Co., 909 Penn. Ave.
Cincinnati, Electrical Engineering & Mfg. Co., 607 Mercantile Library Building.
Cleveland, Electrical Engineering & Mfg. Co., 422 Union Building.
Buffalo, Electrical Engineering & Mfg. Co., 409 Lafayette Building.
Philadelphia, Electric Power Equipment Corp., 412 North 18th St.
Baltimore, O. T. Hall, Sales Engineer, 1926 Edmondson Ave.
Revere, Mass., J. F. Drummey, 75 Pleasant Street.
Los Angeles, Special Service Sales Co., 502 Delta Building.
San Francisco, Special Service Sales Co., 202 Russ Building.
Toronto, Can., Railway & Power Engineering Corp., Ltd., 131 Eastern Ave.



"Quality" Cars

City Cars
Interurbans
Safety Cars
Motor Buses
Trolley Buses

Qualified—

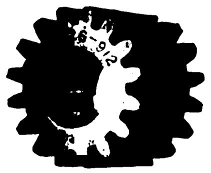
Qualified — by experience, size and established reputation to render "quality service" to electric railway companies.
Send for circulars.

St. Louis Car Company
St. Louis, Mo.
"The Birthplace of the Safety Car"

"Quality" Equipment

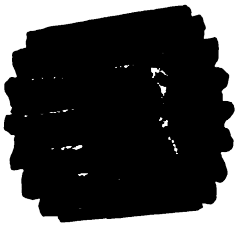
Trucks
Forgings
Castings
Seats
Rattan
Metal Trim
Curtains
General Supplies

Nuttall



Nuttall Pinions are nearly equal in transverse strength and longitudinal strength, due to special processes of forging. This adds immeasurably to their service life and is a feature of great economy to you.

Nothing is omitted, regardless of cost, that will make Nuttall pinions better—special selection of material, accurate machining and grinding, scientific heat treatment, critical inspection. You couldn't get any better value for ten times their cost.



MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA 1923

R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

All Westinghouse Electric and Mfg. Co. District Offices are Sales Representatives in the United States for Nuttall Electric Railway and Mine Haulage Products.

In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

Connecting a branch to the main

How the big Power Co's do it

This is a DOSSERT SOLDERLESS Cable Tap

There is economy in making every electrical connection by the Dossert Solderless method—giving greater conductivity than the wire itself—and without the fuss, danger and damage to insulation that high heat imposes.

The Dossert 15th Year Book below illustrates and describes the services of the different connectors.

DOSSERT
SOLDERLESS CONNECTORS
CATALOGUE FIFTEEN

GET THIS BOOK

FREE

Dossert & Co.
242 West 41st Street
New York, N. Y.

The Baker Wood Preserving Company
CREOSOTERS
Washington Court House, Ohio

Cross Ties Bridge Timbers
Lumber Posts
Piling
Treated and Untreated

We solicit your inquiries

Creosoting Plant located
Washington Court House, Ohio
On—Penna. R.R., B. & O. R.R., D. T. & I. R.R.
Operating Mills in Southern Ohio

Standard Underground Cable Co.
Manufacturers of
Electric Wires and Cables of all kinds;
also Cable Terminals, Junction Boxes, etc.
Boston Philadelphia Pittsburgh Detroit New York
San Francisco Chicago Washington St. Louis

AMELECTRIC PRODUCTS
BARE COPPER WIRE AND CABLE
TROLLEY WIRE
WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
MAGNET WIRE

AMERICAN ELECTRICAL WORKS AMELECTRIC Wires and Cables PHILLIPSDALE, R.I.
Reg. U. S. Pat. Office

Incandescent Lamp Cord

AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.
Boston, 176 Federal; Chicago, 112 W. Adams;
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Third Rail Insulators, Trolley Bases, Harps and Wheels, Bronze and Malleable Iron Frogs, Crossings, Section Insulators, Section Switches
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Standard in the Electric Industries for 35 years
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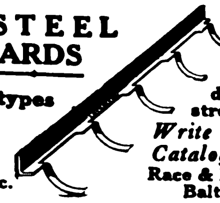

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TRIPLEX

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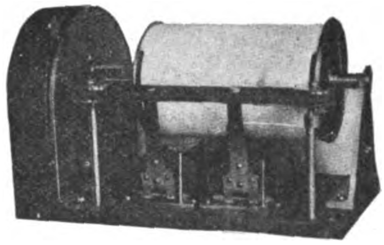

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COMBINE

Lowest Cost **Lightest Weight**
Least Maintenance **Greatest Adaptability**

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THE OKONITE COMPANY
PASSAIC NJ
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Great Adhesive Strength
High Quality
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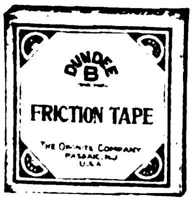

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Incorporated 1884
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Automatic Signals

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AUTOMATIC SIGNAL

for single track block signal protection

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ANACONDA COPPER MINING COMPANY
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ESTABLISHED
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Special Track Equipment and Layouts of all kinds

THE BUDA COMPANY
Harvey (Suburb Chicago) Illinois

High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
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IMPROVED ANTI-KICK BIG-HEEL SWITCHES
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Established 1858

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Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
Kerwin Portable Crossovers
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An automatic dump car, an electric locomotive, a snow plow, and a freight car—all in one. Big savings shown in track construction and maintenance, paving work, coal hauling, ash disposal, snow removal, and freight transportation.

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Findlay, Ohio

Series Type
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Rugged series resistance coil
Indestructible Mica insulation
Normal welding current at half voltage

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Electrically Welded Joints

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is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

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high-grade R. R. Track and Car Jacks

The Buckeye Jack Mfg. Co.

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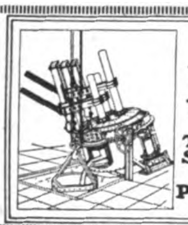

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Most Rapid and efficient for making
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RACOR Tee Rail Special Work.
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All-metal cross ties

Types for open and closed tracks
"More flexible than wood"

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Ask for circular on either type. *Prices upon application.*

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Sole Manufacturers
"HONEYCOMB" AND "ROUND JET" VENTILATORS
for Monitor and Arch Roof Cars, and all classes of buildings;
also ELECTRIC THERMOMETER CONTROL
of Car Temperatures.

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1328 Broadway
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THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED

No. 478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

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Car Heating and Ventilation

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

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A necessity for turbine protection, engine cylinder economy and utilization of superheat for all its benefits

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CHAIN-HOISTS

Strong and compact. Ideal where heavy lifting must be done frequently, speedily and with highest efficiency. Made in capacities from ¼ to 20 tons.

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Look for The Green Loop Guide

2235-D

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Ohmer Fare Registers offer the only safe and satisfactory method of protecting fare collections in one-man cars.

They apply correct business principles to the sale of electric Railway Transportation.

They are made in many types and sizes.

Ohmer Fare Register Company

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Type R-10

International Registers

Made in various types and sizes to meet the requirements of service on street and city system. Complete line of registers, counters and car fittings.

Exclusive selling agents for HEEREN ENAMEL BADGES.

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FARE BOXES
always
Fit the Fare and
Fare Collection System

The Cleveland Fare Box Co.
Cleveland, Ohio
Canadian Cleveland Fare Box Co., Ltd.
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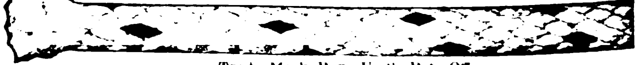
CAR SEATS

of pressed Steel for all Classes of Passenger Service. Rattan for covering seats and for snow sweepers.

HEYWOOD-WAKEFIELD CO.
Factory at Wakefield, Mass.
Offices at New York, Chicago, San Francisco

For detailed description — see — CAR BUILDERS CYCLOPEDIA 1922 Edition



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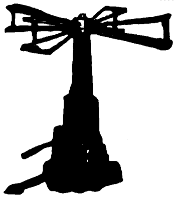
Trade Mark Reg. U. S. Pat. Off.

Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.



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PEREY TURNSTILES
or PASSIMETERS

Use them in your Prepayment Areas and Street Cars

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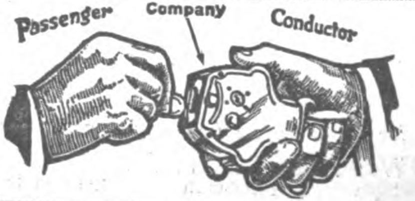

Direct
Automatic
Registration
By the
Passengers

Rooke Automatic
Register Co.
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EMPLOYMENT-BUSINESS OPPORTUNITIES-EQUIPMENT

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Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

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Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

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E. R. J.

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is devoted exclusively to the advertising of idle used and surplus new equipment, and all other business "Opportunities" identified with the field covered by this paper.

Buyers and others consult "Searchlight" ads for what they want.

You can reach them quickly and at small cost through an advertisement in the Searchlight Section.

0810

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COMPETENT general superintendent wanted, age between 30 and 45 years, City system, about 30 miles of track, location, Williamsport, Pa. Give full outline of experience, references and salary desired first letter. P. O. Box 371, Williamsport, Pa.

POSITIONS WANTED

ELECTRIC arc welder, experienced in joint welding, bonding and surface work. Can furnish good references. Open for immediate employment. PW-618, Elec. Ry. Journal, Leader-News Bldg., Cleveland, Ohio.

MR. MANAGER, are you in the field for a superintendent of transportation? If so, you should realize that practical experience is an important factor in the successful handling of this department. The writer of this ad has a proven successful record of nineteen years on city, suburban and interurban properties and can furnish high grade refeernces as to character and ability to get results on any property regardless of size or condition of same; at present with large property; personal reasons for making a change. PW-617, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

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3—New 200 kva., 60-cy., single phase, 13200/2300-v. General Electric Transformers, complete with oil. Immediate delivery.

THE TOLEDO & INDIANA RAILROAD CO.
714-718 Washington St., Toledo, Ohio

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Cars, Locomotives, Tanks, Steel Piling Fairbanks-Morse standard gage Gasoline Motor Car; seats 34 people.

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St. Louis, Mo.

FOR SALE

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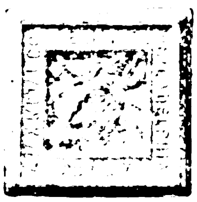
11—Form 8 Tomlinson Automatic Radial Couplers.

TRANSIT EQUIPMENT COMPANY
501 Fifth Avenue, New York.

FOR SALE

50—G. E. No. 80-A Motors.
50—Controllers, K-28-B; K-12.
35—B-2 Compressors.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.



ROLLING STOCK

"that rolls"

USUALLY HAS AXLE BEARINGS

lined with

AJAX BULL BEARING ALLOY

BETTER THAN BABBITT

Wears Longer—Runs Cooler—Costs Less

THE AJAX METAL COMPANY

Established 1880

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B. A. Hegeman, Jr., President Charles C. Castle, First Vice-President
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W. C. Lincoln, Manager Sales and Engineering

National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., N. Y.

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Drew Line Material & Railway Specialties
Genesco Paint Oils
Turnstile Car Corporation—Turnstiles
Economy Electric Devices Co.
Power Saving and Inspection Meters
Fort Pitt Spring & Mfg. Co., Springs
C-H Electric Heaters
Garland Ventilators
E-Z Car Control Corp. Safety Devices
Lind Aluminum Field Coils
Flaxlinum Insulation
National Safety Car Equipment Co.'s One-Man Safety Cars
Anderson Slack Adjusters

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for Electric Railways and Motor Buses.
Unexcelled for ventilation and appearance.
Write for new catalogue

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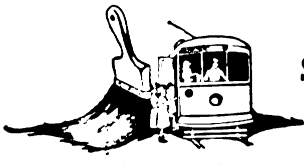
Railway and Power Engineering Corporation, Ltd.
133 Eastern Avenue, Toronto, Ontario



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Sells Transportation

Let our experts on railway car finishing demonstrate Beckwith Chandler paints and varnishes. Write for details.

Beckwith-Chandler Co., 203 Emmett St., Newark, N. J.

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Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

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Air Receivers & Aftercoolers
Ingersoll-Rand Co.

Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Standard Steel Works Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Elec. Service Supplies Co.

Automatic Return Switch Stands
Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

Axles
Bemis Car Truck Co.
Standard Steel Works Co.
St. Louis Car Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Westinghouse E. & M. Co.

Babbitt Metal
Ajax Metal Co.

Badges and Buttons
Elec. Service Supplies Co.
International Register Co., The

Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
General Electric Co.
Gilbert & Sons B. F. Co., A.
St. Louis Car Co.
Westinghouse E. & M. Co.

Bearings, Center and Boller Side
Baldwin Locomotive Works
Stucki Co., A.

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Brill Co., The J. G.
Consolidated Car Heati'g Co.
Elec. Service Supplies Co.
St. Louis Car Co.

Boilers
Babcock & Wilcox Co.

Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.

Bonds, Rail
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse E. & M. Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
National Ry. Appliance Co
Westinghouse Tr. Br. Co.

Brake Shoes
Amer. Br. Shoe & Fdy. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
National Brake Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.

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General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Morganite Brush Co.
Stackpole Carbon Co.
U. S. Graphite Co.
Westinghouse E. & M. Co.

Brushes, Graphite
U. S. Graphite Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.

Brushes, Wire, Pneumatic
Ingersoll-Rand Co.

Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

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Irvington Varnish & Ins. Co.

Carbon Brushes (See Brushes, Carbon)

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Differential Steel Car Co.
St. Louis Car Co.

Car Lighting Fixtures
Elec. Service Supplies Co.

Car Panel Safety Switches
Consolidated Car Heati'g Co.
Westinghouse E. & M. Co.

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Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
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Cars, Gas, Rail
St. Louis Car Co.

Cars, Second Hand
Electric Equipment Co.
Transit Equipment Co.

Cars, Self-Propelled
General Electric Co.

Car Signal System
Fahnestock Elect. Co.

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Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.

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Castings, Malleable and Brass
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
St. Louis Car Co.

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Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

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Archbold-Brady Co.

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Cleveland Fare Box Co.

Circuit-Breakers
General Electric Co.
Westinghouse E. & M. Co.

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Anderson Mfg. Co., A. & J. M.
Dossert & Co.
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Cleaners and Scrapers Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
St. Louis Car Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
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Coils Armature and Field
Economy Elec. Devices Co.
General Electric Co.
Westinghouse E. & M. Co.

Coils, Choke and Kicking
Elec. Service Supplies Co.
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Coin Counting Machines
Cleveland Fare Box Co.
Intern'l Register Co.

Coin Sorting Machines
Cleveland Fare Box Co.

Coin Wrappers
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Elec. Service Supplies Co.
General Electric Co.
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Commutator Truing Devices
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General Electric Co.
Westinghouse E. & M. Co.

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Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.

Compressors, Air Portable
Ingersoll-Rand Co.

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General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

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Dossert & Co.
Westinghouse E. & M. Co.

Connectors, Trailer Car
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
Ohio Brass Co.

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General Electric Co.
Westinghouse E. & M. Co.

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General Electric Co.
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Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

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Anaconda Copper Mining Co.

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Brill Co., The J. G.
Elec. Service Supplies Co.
Internat'l Register Co., The
Roebling's Sons Co., John A.
St. Louis Car Co.
Samson Cordage Works
Silver Lake Co.

Cord Connectors and Couplers
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.

Cranes
Allis-Chalmers Mfg. Co.

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossing, Frog & Switch
Ramapo Ajax Corp.
Wharton, Jr., & Co., Wm.

Crossing, Manganese
Ramapo Ajax Corp.

Crossings
Ramapo Ajax Corp.

Crossings, Track (See Track, Special Work)

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Ohio Brass Co.

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Brill Co., The J. G.
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Morton Mfg. Co.
St. Louis Car Co.

Dealer's Machinery
Elec. Equipment Co.
Toledo & Indiana R.R. Co.
Transit Equip. Co.
Zelnicker Supply Co., Walter A.

Derailing Devices (See also Track Work)

Derailing Switches
Ramapo Ajax Corp.

Destination Signs
Elec. Service Supplies Co

Detective Service
Wish-Service, P. Edward

Doors & Door Fixtures
Brill Co., The J. G.
General Electric Co.
Hale & Kilburn Co.
St. Louis Car Co.

Door Operating Devices
Brill Co., The J. G.
Consolidated Car Heati'g Co.
General Electric Co.
Nat'l Pneumatic Co., Inc.

Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.

Drills, Rock
Ingersoll-Rand Co.

Drills, Track
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ingersoll-Rand Co.
Ohio Brass Co.

Dryers, Sand
Elec. Service Supplies Co.

Ears
Ohio Brass Co.

Electrical Wires and Cables
Amer. Electrical Works
Amer. Steel & Wire Co.
Roebling's Sons & Co., J. A.

Electric Grinders
Railway Track-work Co.

Electrodes, Carbon
Railway Track-work Co.

Electrodes, Steel
Railway Track-work Co.

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Beckwith-Chandler Co.

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Arnold Co., The
Beeler, John A.
Bibbins, J. Rowland
Buchanan & Lay Corp.
Day & Zimmerman, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelly Cooke & Co.
Ong, Joe R.
Parsons, Klapp, Brinkerhoff & Douglas
Richey, Albert S.
Sanderson & Porter
Sangster & Co., A.
Stevens & Wood
Stone & Webster
White Eng. Corp., The J. G.
Wortham, Edwin

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Ingersoll-Rand Co.
Westinghouse E. & M. Co.

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Economy Elec. Devices Co.
Cleveland Fare Box Co.
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Amer. Steel & Wire Co.

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Consolidated Car Fender Co.
Elec. Service Supplies Co.
St. Louis Car Co.

Fibre and Fibre Tubing
Westinghouse E. & M. Co.

Field Coils (See Coils)

Flangeway Guards, Steel
Godwin Co., Inc., W. S.

Forgings
Carnegie Steel Co.

Frogs & Crossings, Tee Rail
Ramapo Ajax Corp.

Frogs, Track (See Track Work)

Frogs, Trolley
Ohio Brass Co.

Furnaces, Elec
Pittsburgh Elec. Furnace Corp.

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Consolidated Car Heati'g Co.
General Electric Co.
Westinghouse E. & M. Co.

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General Electric Co.

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Power Specialty Co.
Westinghouse Tr. Br. Co.

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General Elec. Co.
Westinghouse E. & M. Co.

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Brill Co., The J. G.
St. Louis Car Co.

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Gear Cases
Chillingworth Mfg. Co.
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Westinghouse E. & M. Co.

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Bethlehem Steel Co.
Elec. Service Supplies Co.
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Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

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General Electric Co.

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General Electric Co.
Westinghouse E. & M. Co.

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Lorain Steel Co.

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Greases (See Lubricants)

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Railway Track-work Co.

Grinders, Portable Electric
Railway Track-work Co.

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Railway Track-work Co.

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Guard Rails, Tee Rail & Manganese
Ramapo Ajax Corp.

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Elec. Service Supplies Co.
Ohio Brass Co.

Hammers, Pneumatic
Ingersoll-Rand Co.

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Nuttall Co., R. D.
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Thornton Trolley Wheel Co.

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Consolidated Car Heati'g Co.
Cold Car Heat. & Ltg. Co.
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Smith Heater Co., Peter

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Elec. Service Supplies Co.
General Electric Co.
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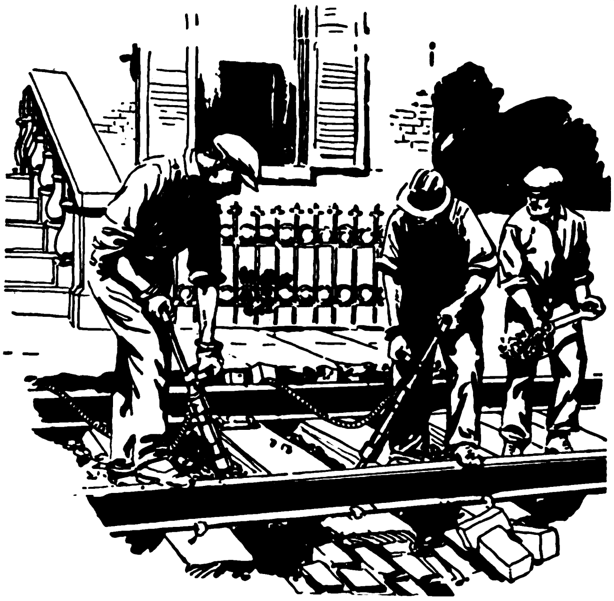

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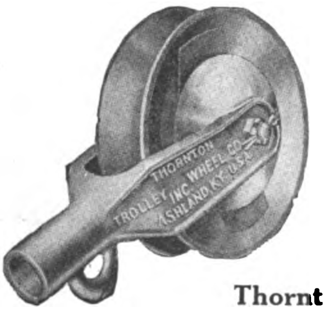

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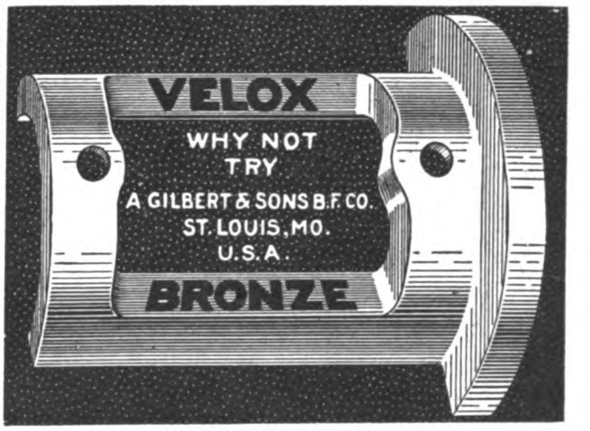
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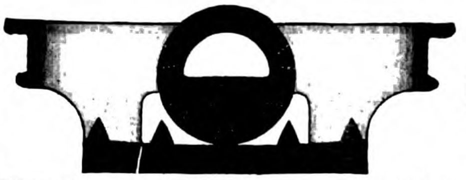

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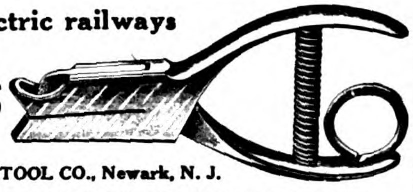

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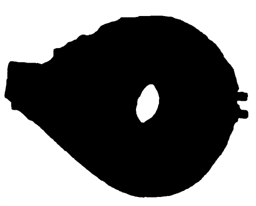

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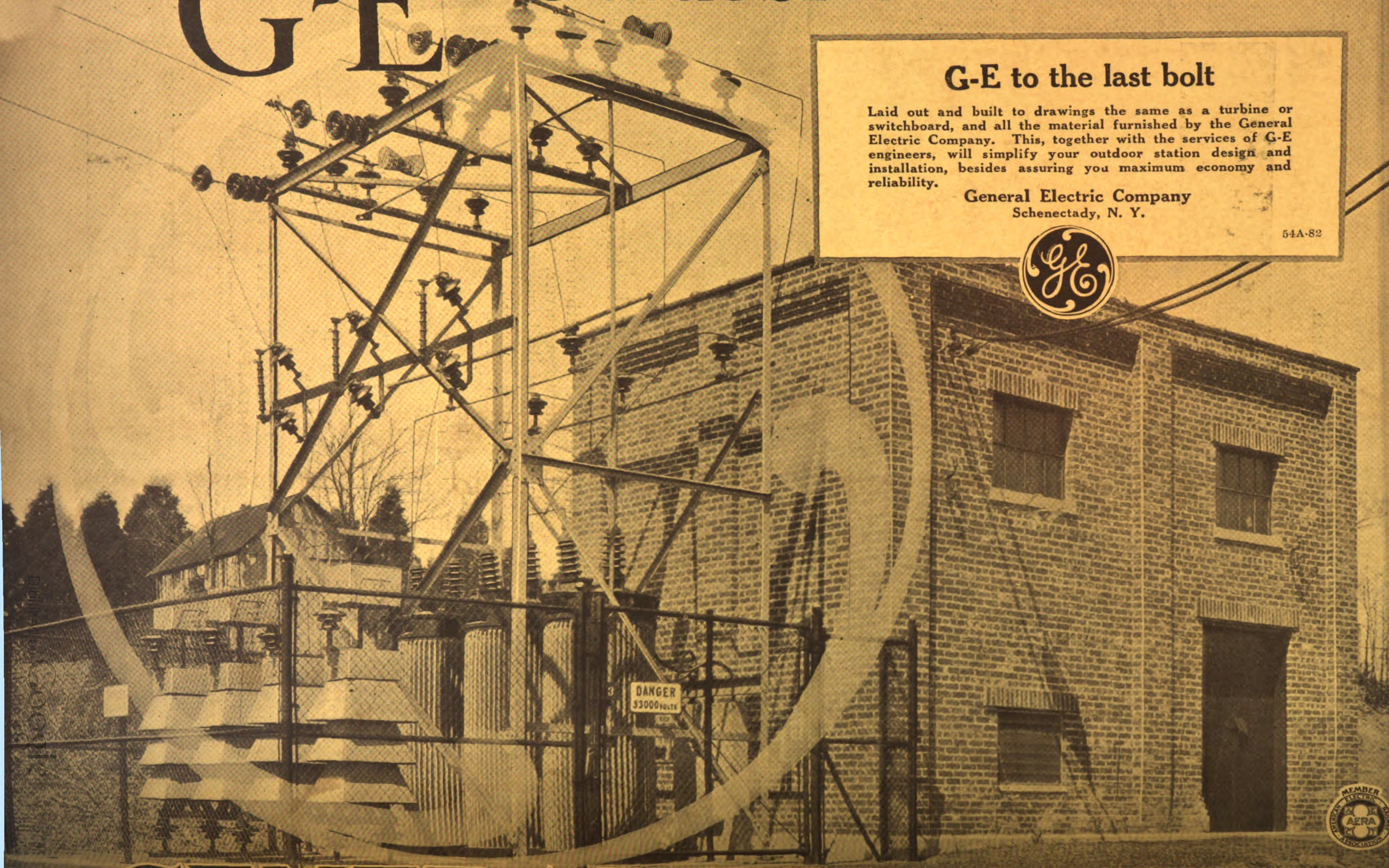

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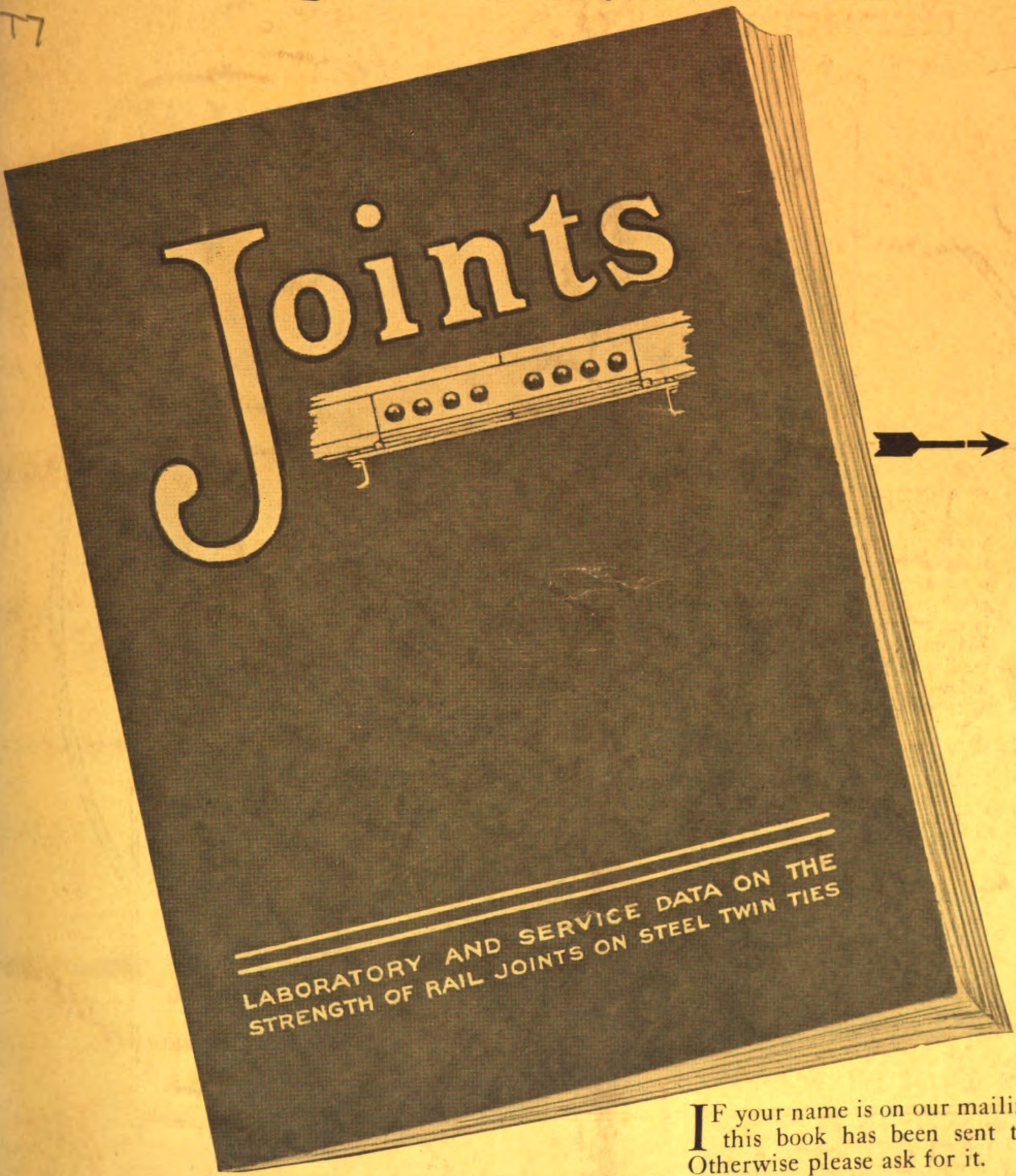
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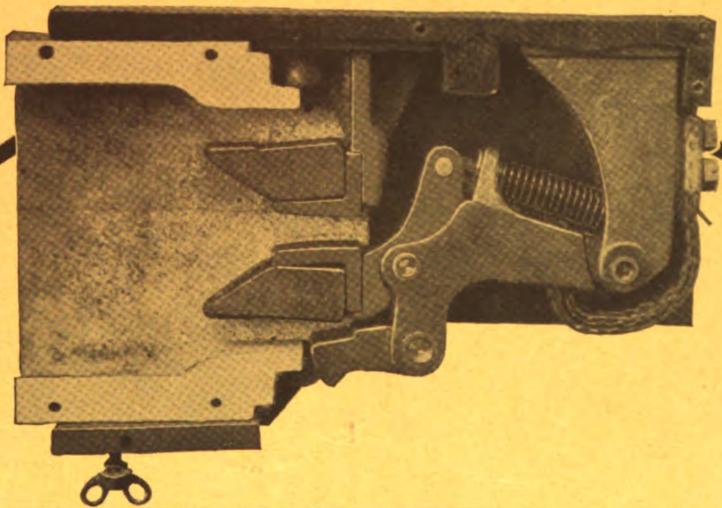

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1923

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W
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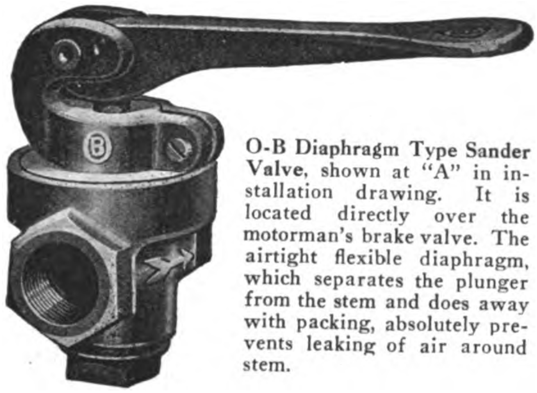

O-B Diaphragm Type Sander Valve, shown at "A" in installation drawing. It is located directly over the motorman's brake valve. The airtight flexible diaphragm, which separates the plunger from the stem and does away with packing, absolutely prevents leaking of air around stem.

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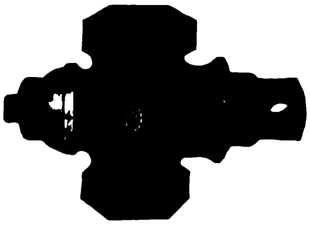

O-B Air Reducing Valve. Can be set to limit, to any desired degree, the amount of air which flows when the sander valve is wide open.

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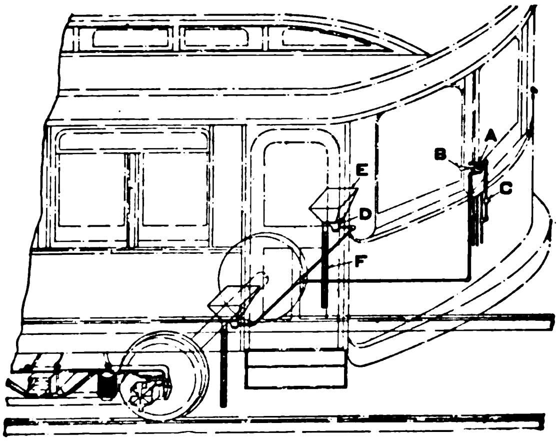

Typical Installation of O-B Equipment

"A" is sander valve; "B" is motorman's brake valve; "C", reducing valve; "D", Sand trap; "E", a hopper that can be built at any convenient point near the wheel; "F", wire sander hose.

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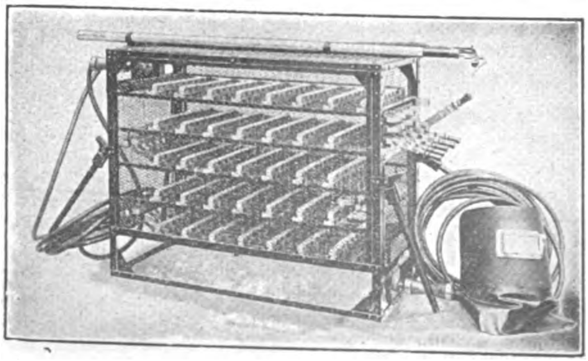

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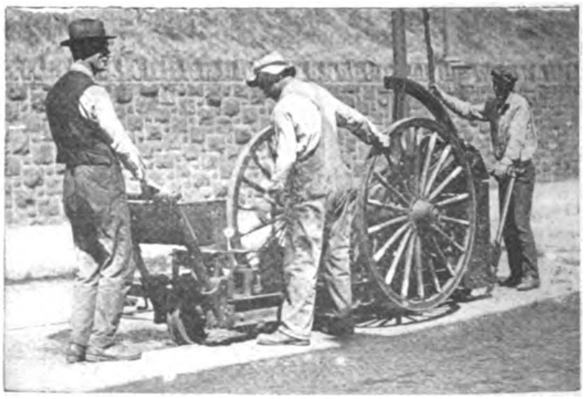

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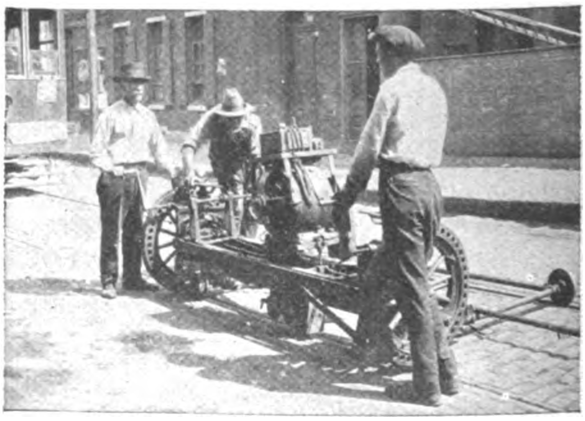

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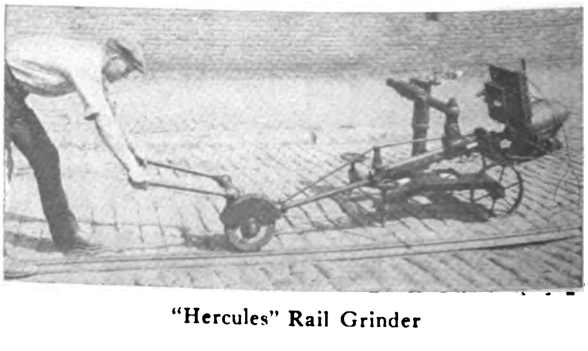
"Atlas" Rail Grinder



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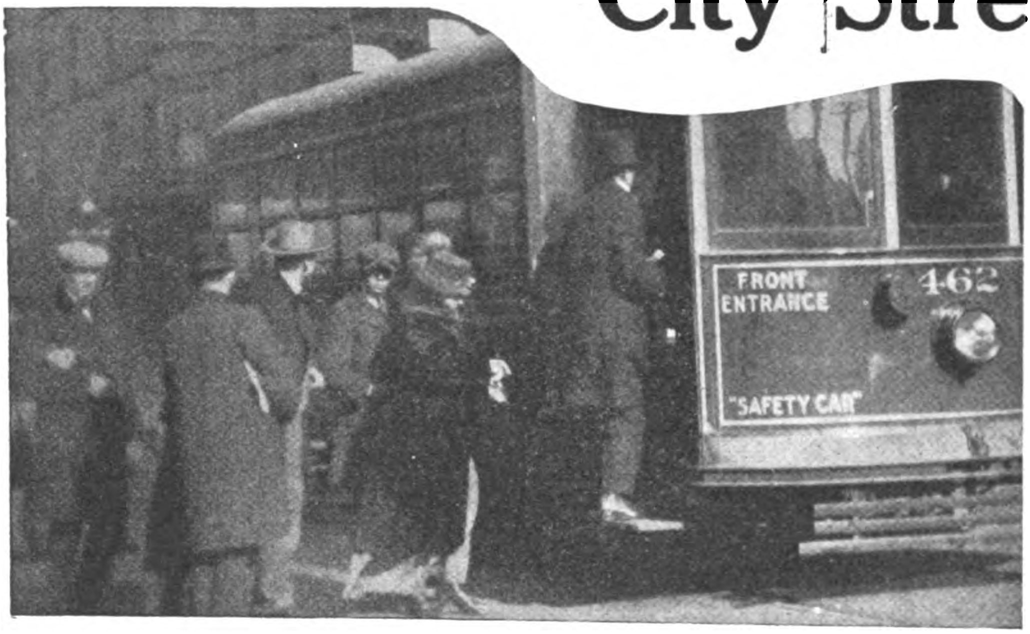

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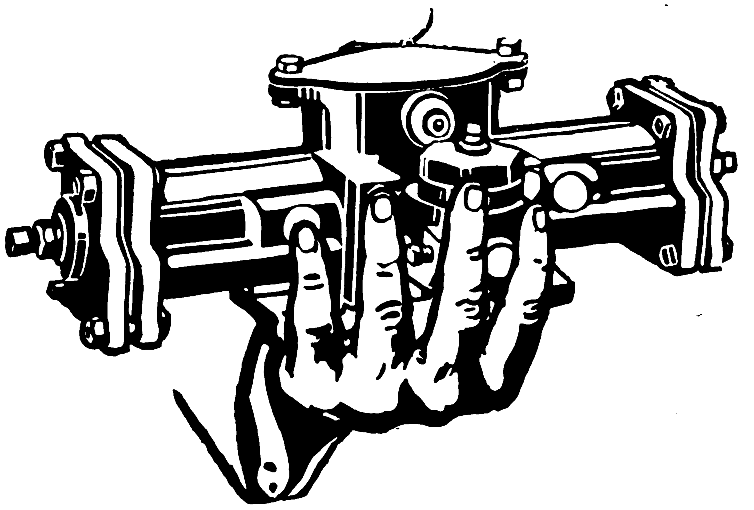

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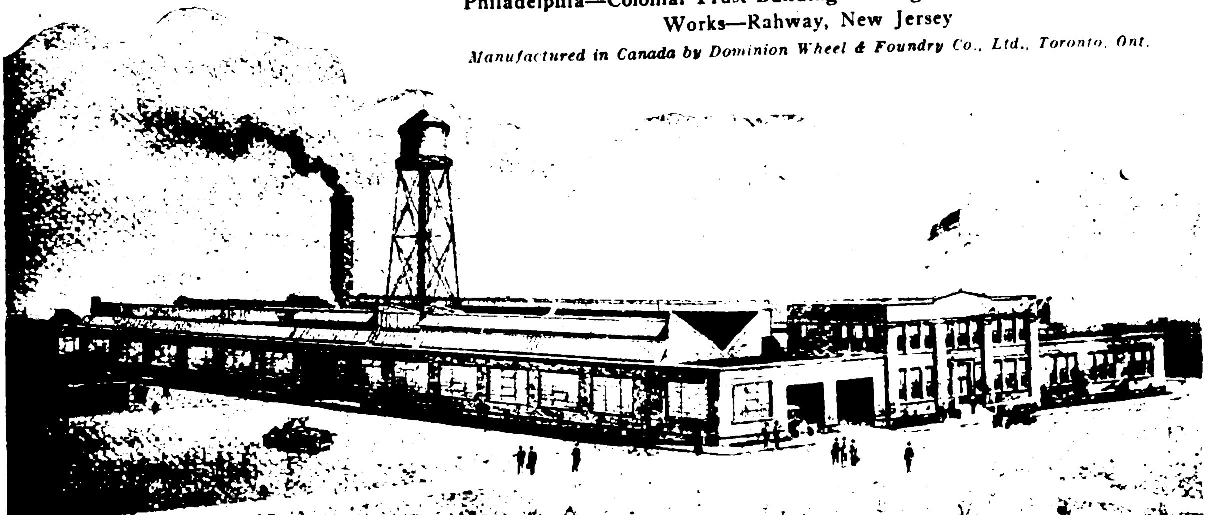

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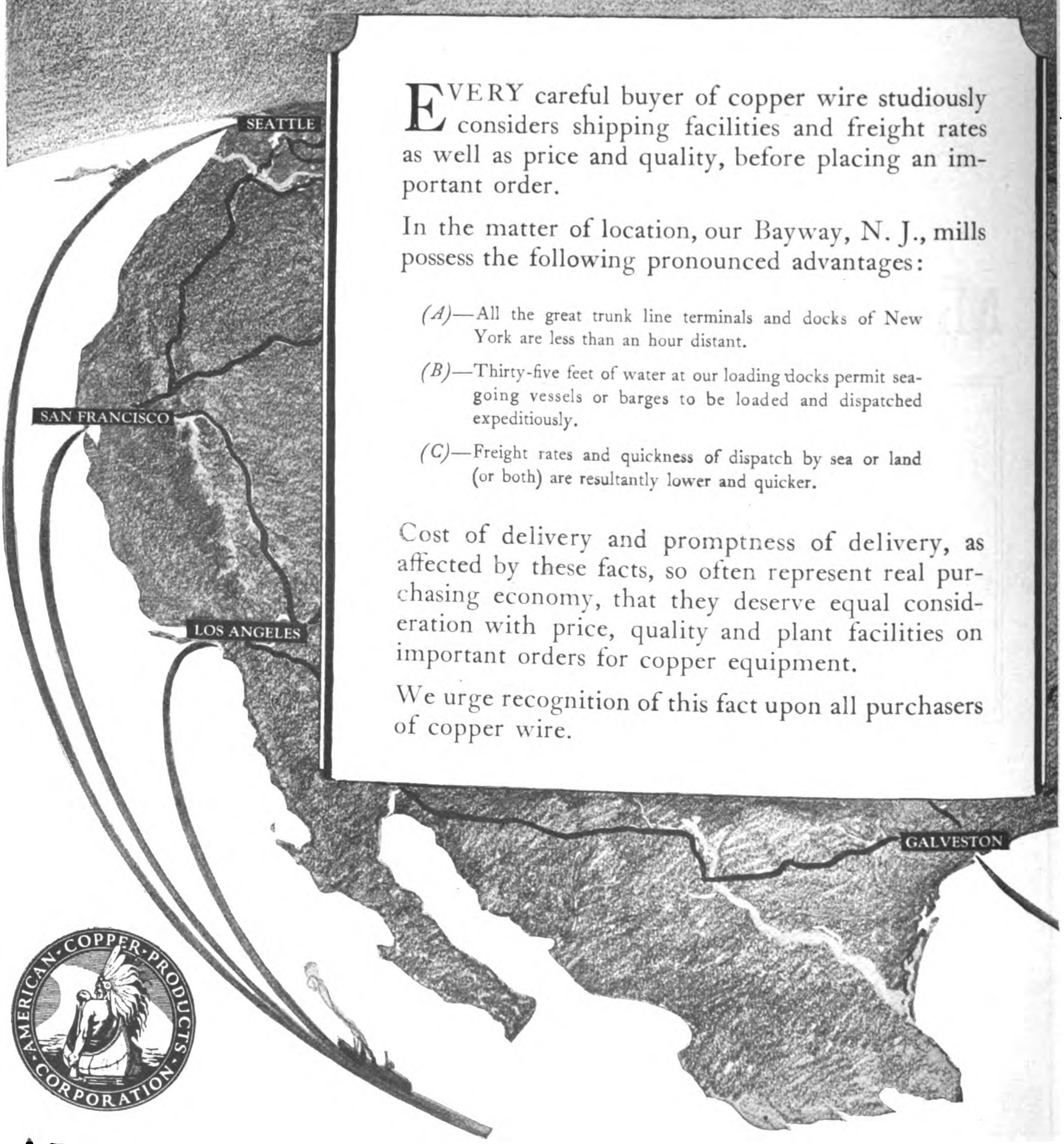
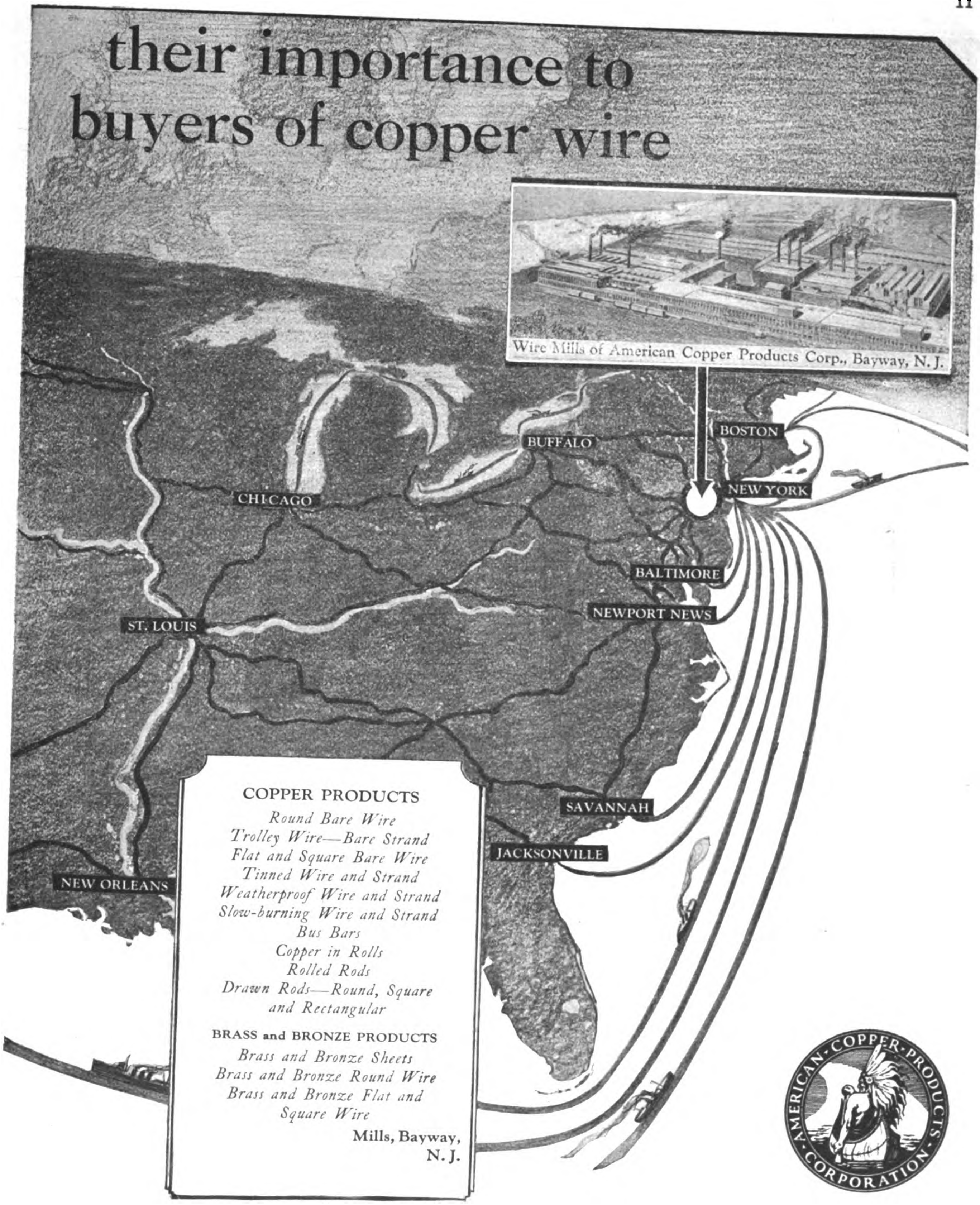
Cost of delivery and promptness of delivery, as affected by these facts, so often represent real purchasing economy, that they deserve equal consideration with price, quality and plant facilities on important orders for copper equipment.

We urge recognition of this fact upon all purchasers of copper wire.



AMERICAN COPPER PRODUCTS CORPORATION
233 BROADWAY NEW YORK


their importance to buyers of copper wire
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Wire Mills of American Copper Products Corp., Bayway, N. J.

COPPER PRODUCTS

Round Bare Wire
Trolley Wire—Bare Strand
Flat and Square Bare Wire
Tinned Wire and Strand
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Copper in Rolls
Rolled Rods
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BRASS and BRONZE PRODUCTS

Brass and Bronze Sheets
Brass and Bronze Round Wire
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Mills, Bayway, N. J.

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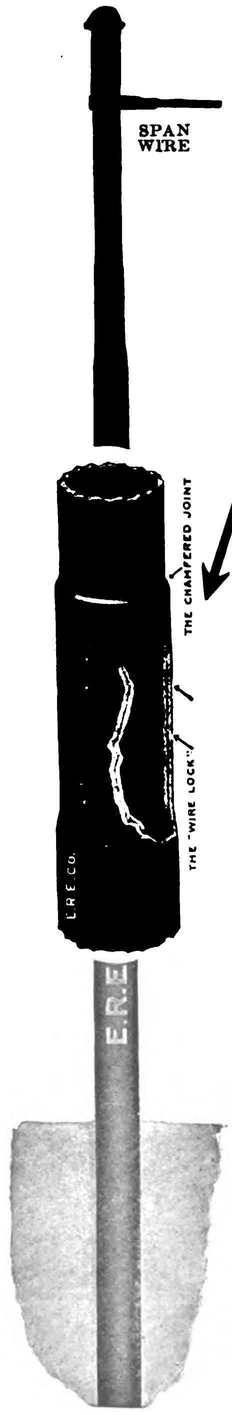
ELRECO POLES

Our patented "wire lock" swedge joint affords maximum strength



Tubular steel poles have long been recognized as superior in mechanical strength. The only shape that develops full strength in every direction is the circular tube.

To the natural efficiency of the steel tube itself, we have added complete efficiency by making the joints 100% strong with our patented "wire-lock" swedge joint, illustrated at the left. With this Elreco construction, your tubular poles will not telescope or collapse at the joints.

Furthermore, the edge of the outer tube at the joint is chamfered as shown, so there is no pocket to collect moisture or dirt, and start corrosion.

Elreco Tubular Steel Poles require practically no maintenance. There is no easier pole to paint.

ELRECO Combination Railway and Lighting POLES

Elreco Poles in combination with highly ornamented G.E. Novalux Lighting Units, are being widely used to replace unsightly wooden poles, to eliminate duplication of facilities and to reduce costs.

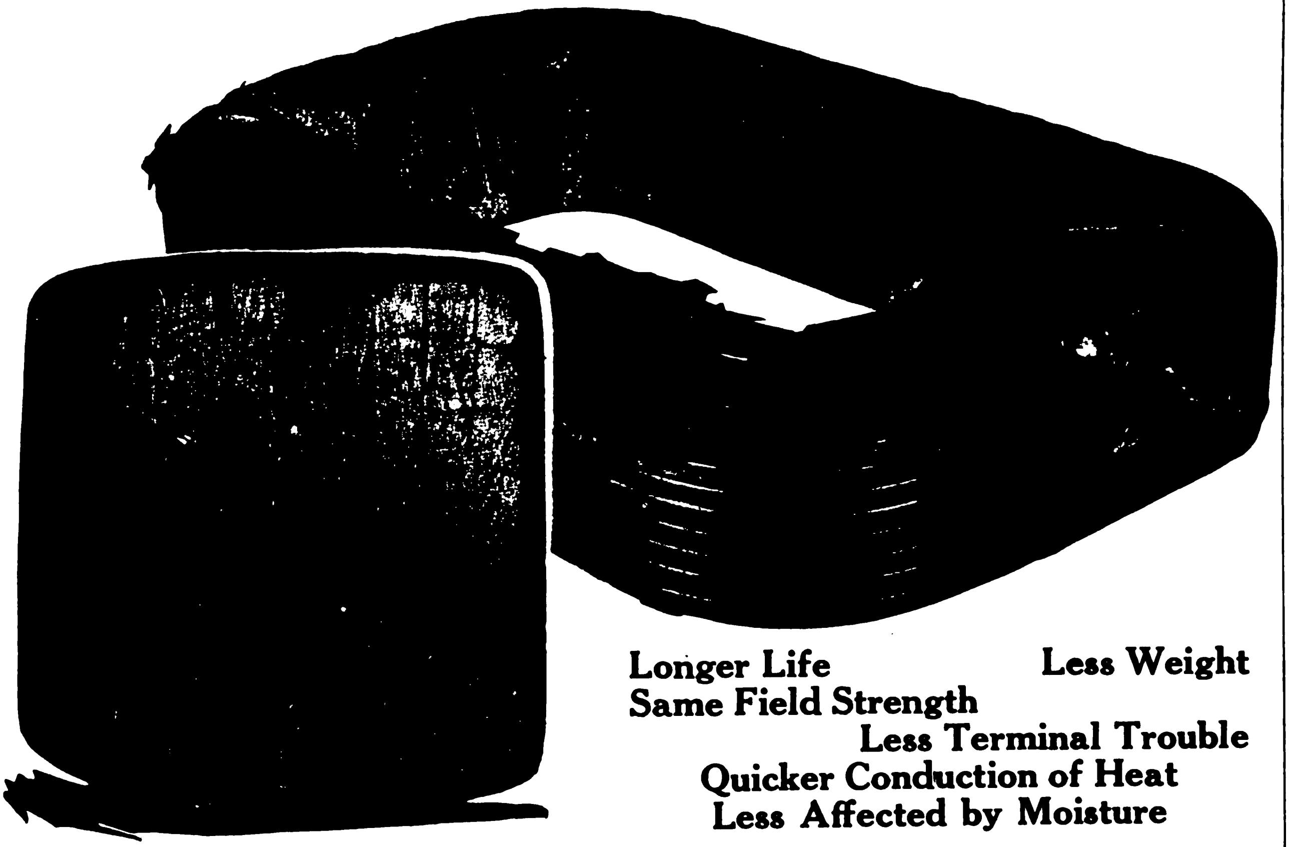
Lowest Cost
Least Maintenance
Lightest Weight
Greatest Adaptability

Electric Railway Equipment Co.
Cincinnati, Ohio
New York City, 30 Church Street

ALUMINUM FIELD COILS

NOW IN SERVICE ON

MORE THAN 60 RAILWAY PROPERTIES



Longer Life **Less Weight**
Same Field Strength
Less Terminal Trouble
Quicker Conduction of Heat
Less Affected by Moisture

The quicker distribution of heat in Aluminum field coils is due to an almost solid metallic path to the exterior via large square wires.

With coils of like resistance the heat generated is identical and aluminum coils are wound to closely duplicate copper coils.

They have the same number of turns and repeated tests show that Lind Aluminum coils develop and maintain full field strength.

The Aluminum oxide insulation is an integral part of the conductor—which means that these coils are less affected by heat and moisture, and since there is no cotton insulation to char or bake out ***shorted fields are practically eliminated.***

The high specific heat of Aluminum compared with copper is another valuable characteristic, especially in coils that are loaded intermittently, as in Railway Service.

Consider these long-life features in addition to that of saving half the weight of all the field coils of every car in many cases a weight reduction of more than 1000 lb.

Let us quote you prices and answer detailed questions

Economy Electric Devices Company

L. E. Gould, Pres., Old Colony Bldg., Chicago

National Railway Appliance Co., New York
L. A. Nott, San Francisco
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Cable Address: Sangamo, Chicago

GENERAL SALES AGENTS:
Sangamo Economy Meters
Lind Aluminum Field Coils
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Detroit Railway Supply Co.
Alfred Collyer & Co., Montreal, Quebec

Bates Poles On The Norfolk and Western Railroad Service

Bates Steel Poles readily and economically adapt themselves to fabrication into combination poles, towers, A frames, and H frames—to meet any requirements of special construction.

Pictured is one of the many seventy foot Bates flood light towers used on the Norfolk and Western Railroad Service.

This is an indication of the almost universal adaptability of Bates Steel Poles to the purposes of the electrical construction engineer.

BATES EXPANDE

BATES EXPANDED STEEL POLES

STEEL POLES

B.E.S.T.

Bates Expanded Steel Truss Co.

Illinois Merchants Bank Bldg.

Chicago, Ill., U. S. A.

BATES ONE PIECE EXPANDED STEEL POLES

"There is your fire danger . .
and there . . and there . ."

THE fire protection engineer had made a professional survey of a large power plant.

He had found fire-extinguishers hung here and there in anticipation of electric fires. But he had also found, practically unguarded, quantities of oil, paint, varnish, and other dangerous fire hazards.

"You are pretty well prepared against what you *expect*," he said, "but it is the *unexpected* fire that causes the most damage."

And then, through his knowledge of fire risks, he was able to outline a system that would protect that plant from fire of any kind.

This scientific service is now available to you

You can benefit by this expert counsel. It is available through the Foamite-Childs Corporation, a company whose business is the placing of the right kind of fire protection in the right place. A company that manufactures every type of chemical fire-extinguishing device and system, and can advise you without prejudice.

The men who represent Foamite-Childs Corporation include graduate engineers—fire protection specialists who have studied, experimented with, and subdued fire in all its manifestations. Their advice is always practical. They can design, install, and maintain protection that covers every fire emergency.

Saving to industry millions of dollars that formerly were lost

Records and testimonials show that Foamite-Childs service has effected a tremendous saving in life and property. Literally thousands of fires that might have destroyed, have been checked at the start. In almost every industry, Foamite-Childs methods have proved that fire can be *surely controlled* when protection conforms to the hazards as a fire protection engineer understands them.

Some of the actual extinguishing devices and means that Foamite-Childs men can supply, once your particular needs have been determined, are listed elsewhere on this page.

You can benefit by his counsel

FOR ELECTRICAL FIRES, the *Fire-Gun* is always efficient. Its non-conducting stream stifles combustion in live electrical equipment. Adopted as standard equipment by many leading railroads and public utilities. Widely used for protecting automobiles and trucks.

FOR BURNING OIL, PAINT, CHEMICALS, and other "extra hazardous" risks, *Foamite* Protection is supremely effective. *Foamite* equipment throws over any burning surface a blanket of carbon dioxide gas bubbles (known as Firefoam) that smothers the fiercest fire. Available in portable hand extinguishers, portable engines, and large stationary systems.

WHILE FOR ORDINARY RISKS, *Foamite* equipment is the best protection. Where Soda-and-acid apparatus is selected, *Childs* extinguishers and engines have been standard for 27 years.

WHERE IT'S VERY COLD, the *Allweather* non-freezing extinguisher functions perfectly, down to 40° below zero, on ordinary fires.

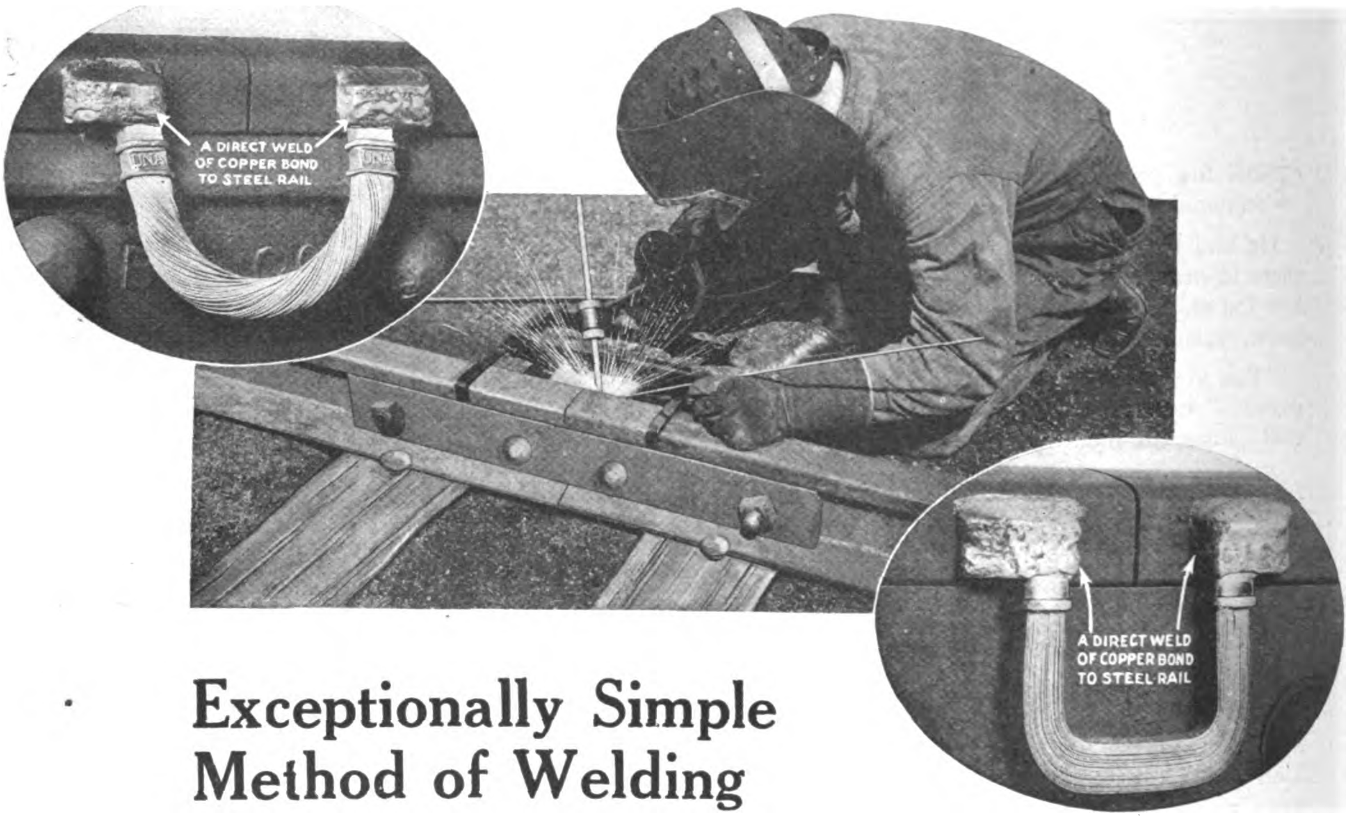
In short, Foamite-Childs Corporation offers complete protection against fire risks of every description. Through our many division offices located at convenient centers, we are equipped to design, install and maintain the fire-protective system precisely adapted to each particular risk. Our engineers will make recommendations and furnish rough estimates that place you under no obligation.

Send for the free booklet, "The Essentials of Self-Protection Against Fire."

Foamite-Childs Corporation

Fire Protection Engineers and Manufacturers
124 Turner Street, Utica, New York
Foamite-Childs of Canada, Ltd., Toronto, Ont.
Sales and Engineering Representatives in the leading cities of all countries

UNA Rail Bonds


A DIRECT WELD OF COPPER BOND TO STEEL RAIL
UNA
A DIRECT WELD OF COPPER BOND TO STEEL RAIL

Exceptionally Simple Method of Welding

UNA Bonding is undoubtedly the easiest method of bonding which is extensively used. New operators without previous welding experience have readily learned to produce good welds by this simple welding process.

No preliminary grinding of the rails is necessary. To weld, the bond is placed in a mold against the rails, then with an electric arc UNA Metal (copper alloy) is melted into the mold and combined with the bond strands to form each finished head. Just as soon as the mold is full—which requires only about 30 seconds—the bond head is welded to the rail.

During this short operation the welding of the all-copper UNA Bond direct to the rails takes place automatically due to the action of the UNA Metal.

Obviously, the simplicity of UNA Bonding is a great help to the operator, for it gives him the opportunity of easily producing good strong welds. This results in the best of bonding, for with UNA Bonds a path of copper is formed from rail to rail, giving maximum electrical conductivity.

Rail Welding & Bonding Company, Cleveland, Ohio

UNA Joints

QUALITY-SERVICE-ECONOMY — GALENA OILS — G O S C

Electric Railway Lubrication

From the very first day!

With the advent of Galena lubrication on an Electric Railway improvements in results are expected. It is but natural that more efficient and economical service be looked for—service that will at least equal that established on all Galena lubricated properties.

And from the very first day these improvements become apparent. They continue with increasing force as the cumulative efforts of Galena Service have eradicated all faulty conditions and installed the oils and methods that have made the name GALENA synonymous with efficiency.

No matter the location of your property—no matter the nature or type of your equipment—GALENA LUBRICATION SERVICE can satisfy your lubrication requirements in a manner that will permit no doubt of its ability to reduce maintenance costs, and provide the necessary conditions to insure protection and longer life to the bearings and motion parts of the machinery that represents one of your largest investments.

"When Galena Service goes in—
Lubrication troubles go out!"

Galena-Signal Oil Company
New York Franklin, Pa. Chicago
and offices in principal cities

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G-E Armature Coils
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RAILWAY
SUPPLIES
GENERAL ELECTRIC COMPANY
SCHENECTADY, N.Y.

36 GENERAL ELECTRIC COMPANY

RAILWAY AND MINE HAULAGE MOTORS

ARMATURE COILS FOR TYPE GE MOTORS

Motor	Volts	Turns	Conductor	Coils in Set	Cat. No.	Net Wt. in Lb. per Set
GE-231	600	4	No. 11 B.W.G.	35	136001	75
GE-232	600 1200	3	No. 10 B.&S.	31	157090	57
-233	600	2	2 No. 10 B.&S.	29	157091	91
3	600 1200	2	2 No. 13 B.W.G.	29	157092	86
34	600	3	No. 11 B.W.G.	29	144377	64
-235	775	1	0.08 x 0.700 in.	37 37	* 157093 † 157094	180 180
E-237	750 1500	2	0.100 x 0.320 in.	39	157096	220
E-238	600	3	No. 10 B.&S.	31	157097	50
GE-239	1200 2400	2	2 No. 10 B.&S.	37	157098	209
GE-240	600	2	2 No. 9 B.&S.	29	177183	140
GE-240	600 1200	2	2 No. 9 B.&S.	29	164504	140

Stick to Known Value

One operator says: "G-E Coils couldn't be improved. So now they're packaged to guarantee original quality on the job."

There is no true substitute for G-E Armature Coils for G-E Motors. And now supplied in cartons, G-E Coils are sure to be preserved undamaged until ready for use. Besides, the cartons are a great convenience, each containing a set of coils for one armature.

To get the same efficiency as from your original coils, to secure maximum armature life, and to insure satisfactory service from your G-E Motors you must rewind with G-E Armature Coils. Each is an exact duplicate of the other.

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GENERAL ELECTRIC

New York, Saturday, November 17, 1923

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 62
Number 20

An Opportunity to Expedite Standardization of Car Parts

THE electric railway industry has had before it for a number of years the general subject of standardization. While the industry is generally agreed that this work is extremely important, it has not been so clear that there are several separate and distinct phases of it that must be treated from different angles.

A letter from the Division of Simplified Practice of the Department of Commerce, dealing with one important phase which has not been given much attention, was published on page 744 of the Oct. 27 issue of this paper. It refers particularly to the work of obtaining more uniformity in the many commonly used car parts which usually differ in some small ways as supplied by the different manufacturers or car builders. As expressed by this division of the Department of Commerce its co-operation with the railway industry would be more in the nature of clearing the field so real standardization could be more effectively and expeditiously accomplished. A review of present varieties of any one article or commodity and a determination of the relative demand for each variety usually suggests the elimination of a large number as being superfluous; and then agreement among manufacturers and users of that item to concentrate on the remaining varieties leads directly into the consideration of improved quality, performance and design of standards. Simplification is a necessary preliminary step in the campaign that is essential in order to carry out successfully any standardization program on a property, no matter of what size.

To obtain some concrete illustrations of the magnitude and importance of this subject a survey was recently made in one of the shop storerooms on a large railway property. The conditions on this particular property are far better than the average, due to the fact that the cars have been purchased in comparatively large groups, thus reducing the number of different groups and consequently the number of different sets of parts. In addition an active equipment engineering organization has been engaged for a number of years in a campaign of simplification which has in many instances materially reduced the number of different lots of parts required for purposes of maintaining the cars and equipment.

Even under these very favorable conditions many examples of the needs for simplification were apparent. There were eight different combinations of hand strap hangers and grips; five different types of bell cord pulley supports; a wide range of cupboard catches, latches, register mechanism fittings and hinges of various sizes for cabinets and folding doors; five different lots of rubber insulating bushings for lead outlets in motors, and various designs and sizes of motor lead terminals which required that sixty different lots of made-up motor leads be carried in stock. Variations in the size and design of control resistors required eight different lots of mica insulating tubes, twelve lots of mica washers and a large number of different lengths and sizes of rods and frame parts. Many examples of special parts which were required in comparatively small quantities but of many different varieties were found. In most cases these parts must be manufactured to order from samples and the problem of keeping a supply of parts on hand is a serious one. Switches, fuse blocks and boxes for auxiliary circuits were stocked in a large range of varieties. Electric heaters of approximately the same capacity per unit were constructed and rated in so many ways that twenty different types of coils were carried in stock. Even then a still larger variety were being wound to order as required. There were six different sizes and types of truck turnbuckle castings and forty different lots of grab-handle castings. The number of lots of corresponding parts for door and step mechanisms roughly coincided with the number of groups of cars on the property. There were forty different types or sizes of motor and gear case oil box covers, nine types of sand hose supports and an extremely wide variety of seat parts and fittings.

These are merely a few examples illustrating a condition which is rather difficult to visualize. But the above description is only the operating side of the general picture, and is taken in one storeroom supplying only a portion of one property that may be said to represent one of the best situations that could be found. Apply these facts to a property whose cars have been purchased in many small lots and then multiply by the number of different railways and we begin to get a view of the manufacturing side of the picture. The net results of the condition are needlessly high prices for parts, high costs of maintenance, high investment in stores and high expense of stores keeping.

Judging by the success the Division of Simplified Practice has had along these lines in other branches of industry, the JOURNAL believes that the American Electric Railway Engineering Association might well give serious consideration to some plan for securing co-operation of the various interests in the electric railway field.

Maintenance Ideas Should Be Put to Work

TRIPS made about the country by the editors of this paper, visiting many electric railways, disclose great variations in the methods of doing maintenance work of substantially the same character. While all of the practices may produce results that are satisfactory, in so far as they keep the property in fair operating condition, it is quite noticeable that there is a great difference in the relative efficiency of the various methods. This applies to shop, track and line with about equal emphasis.

The good old term "local conditions" used to be brought forward regularly as an alibi for retaining some backward practice. The term is not heard so frequently now, probably because of the ridicule bestowed upon it. The excuse now used is the lack of money to purchase new and improved shop and construction equipment.

This paper is devoting considerable space, and much thought and effort, to the work of bringing to the attention of maintenance men throughout the industry the best of the methods that have been devised by progressive executives and workmen. Fortunately, many of the methods cost little to install, while they produce excellent results. But of how many of these improvements has your shop taken advantage? And how many maintenance articles have given you ideas for still better methods than those described? And have these ideas been carried out?

It would be well for the maintenance men to check up and see if everything possible has been done to improve the methods in use, keeping in mind that an improvement in the standards of maintenance usually results in an ultimate reduction of costs. In the meantime the transportation department has had the advantage of better tools to work with, and the public, in its turn, undoubtedly has reflected its approval in greater patronage of the cars.

Is Enamel Better than Varnish for the Car Interior?

AN INTERESTING speculation aroused by the exhibits of the paint manufacturers at the recent convention at Atlantic City concerns the value of enamel as a substitute for varnish in repainting of cars. Every electric railway man is familiar with the difficulty of making old and battered woodwork in the car interior fresh and clean looking when the car is renovated. It is a comparatively simple matter to repaint the metal parts, both inside and out, and give them a luster equal to the original appearance when first they came from the car builders. But the problem is not so simple with the woodwork. Inevitably, this becomes dingy with age, battered by the carelessness of trainmen and passengers and otherwise defaced. No matter how carefully the varnish is removed and the new applied, it is impossible to restore the original freshness of the material. Moreover, varnish removal and sandpapering is an expensive process. Many railways simply varnish over whatever dirt is on the wood. In the course of time, by this process, a thick coating of varnish accumulates and acts as a lens to magnify the underlying defacement.

The use of a solid color enamel is being tried to overcome the difficulty. This is in line with the practice on many steam roads, although in the case of their more modern cars, there is likely to be less wood trimming in the interior. That, however, is a minor difference and in no way affects the general principle. By simply smoothing down the surface of the wood and then covering it with a coating of solid color enamel of some dark color, such as maroon, the majority of the blemishes in the woodwork are entirely concealed. In order to relieve the monotony resulting from the use of a solid color, railways which have adopted this method of repainting the car interior apply a little hand striping and trimming.

It is perhaps too early to reach any definite conclusions of the value of this treatment of defaced woodwork in electric railway cars. So far it has been tried only on a comparatively few properties. But it seems nevertheless that there are a number of advantages in the methods and that it deserves careful consideration when any extensive program of car renovation is contemplated.

Co-ordinating Motor Drives for Efficient Shop Work

ELECTRIC railway shops still furnish many conspicuous illustrations of the obsolete plan of group driving of machine tools. The life and service obtained from many of the motors have been so satisfactory that in many shops the replacement of these with more modern equipment having individual motor drive has lagged far behind the advance of engineering design. Power has often been looked upon by railway shopmen as too cheap a commodity to worry about, and the need of getting along in so many cases with old shops and equipment has also precluded systematic improvement of motor drives.

But repair shops that have modernized their drives have reaped the reward of their progressiveness. Elsewhere in this issue are presented views of individual motor installations in the Chelsea shops of the Eastern Massachusetts Street Railway, and the reader who sees beyond the machine "close-up" in these pictures will be impressed with the general value of independent tool operation. Clearer working spaces, more compact tool areas, increased safety to employees, a lighter shop, more flexible use of tools and power conservation, all follow the banner of the individual motor drive into the zone of more efficient shop service.

One word of caution should be sounded in regard to shop electrification, and this warning is an economic one. New machine tools with motors especially designed for them may prove more economical, production considered, than remodeling the drive for the present tools. Within recent years machine tool and motor manufacturers have been drawing closer together in mutual design work, so that today a wide range of high-grade machine tools admirably equipped electrically is available for great varieties of shop operating. The master mechanic confronted with the problem of modernizing his shop drives will thus do well to study the new designs and costs of available unit tools built for high efficiency service on self-contained motor drive basis.

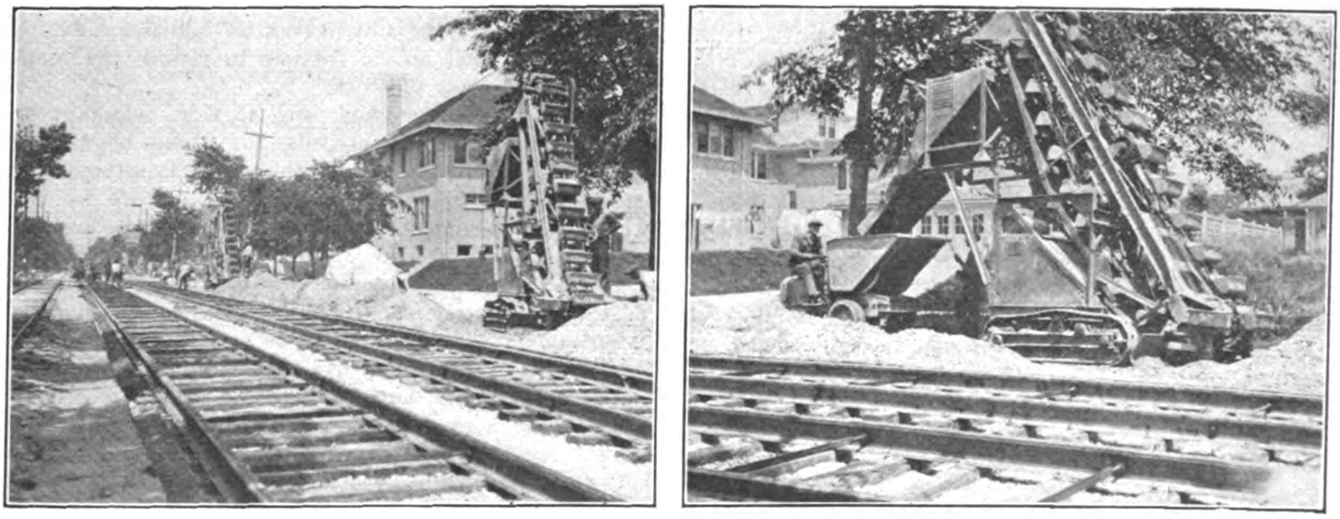
He may find, in this case or that, lower total costs by adapting existing tools and motors to mutually co-ordinated service; but he is more likely to discover that the economic solution is to buy entirely new equipment. General purpose motors can be applied with much success to constant-speed tool driving, and the skillful use of angle-iron and other metal shapes in making up motor mountings often solves a most difficult appearing problem in tool powering. The whole question of how best to drive shop tools is a very important one and examples like those pictured from Chelsea are full of suggestions that will make their appeal to the discerning mechanical eye.

Machines Facilitate Track Zone Pavement

Distribution of Material to Make Convenient Its Delivery to Concrete Mixer and the Use of Loaders and Tractors Have Helped the Milwaukee Electric Railway & Light Company to Get Good Results in Track Paving and Lower the Cost

THE way and structure department of the Milwaukee Electric Railway & Light Company has been paying particular attention to the development of methods and devices for dispensing with hand labor to the fullest possible extent in track and paving work. A recent improvement in this direction is the application of labor-saving equipment to the track zone paving operation.

With the increasing use of concrete pavement the company made a study to find the most economical scheme of placing the material for the construction. The amount of material necessary for pouring a particular stretch of track is figured out beforehand and the materials are apportioned and placed on the adjoining pavement by means of steel Differential dump cars.



Left—Material Distribution and Equipment Arrangement for Concrete Paving Work in Milwaukee. In the Foreground Is the Crushed Stone and Loader; Beyond the Cement Is Piled; then the Sand and Sand Loader, and in the Background the Concrete Mixer. Right—Truck Tractor Receiving Measure of Gravel at Loader

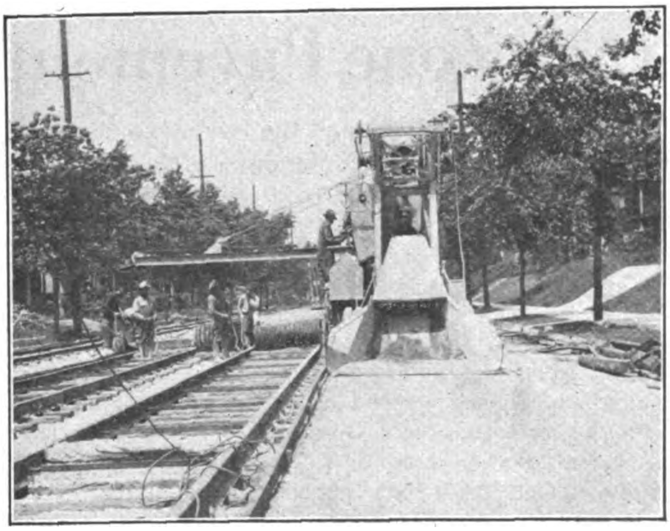
Alternate piles of sand and gravel are supplied, starting 200 ft. from the mixer, in such quantities that each pile provides sufficient material for 100 ft. of pavement. As an example, a particular stretch of track under construction required 22 yd. of sand, 38 yd. of gravel, 290 bags of cement per 100 ft. and a series of unit supplies of these amounts of materials were placed the entire length of the new construction.

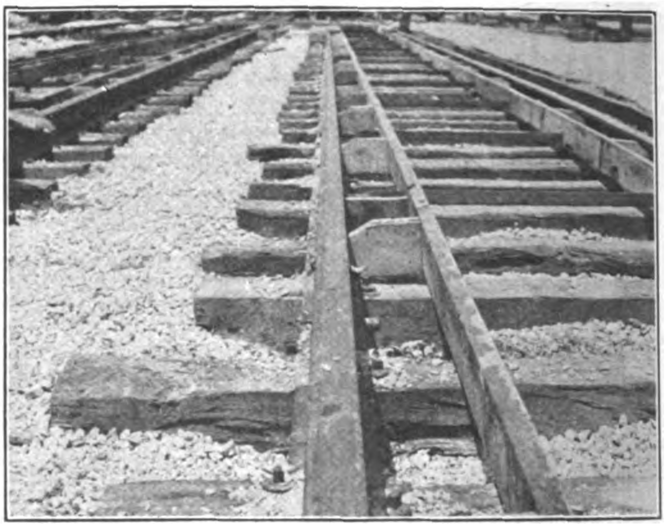
The materials are taken up from the street and placed in measuring hoppers, by means of Barber-Greene loaders, and conveyed from the hoppers to the concrete mixer in Clark 1-yd. capacity truck tractors, two loaders and three truck tractors being used on a job. In order to obtain the proper mix and get the most efficient pick-up of materials the mixer is set nearest the sand pile with its conveyor, while the adjoining gravel pile and its conveyor are a little further away from the mixer, with the cement in sacks piled at convenient intervals along the curb midway between the two conveyors.

The procedure is for a truck tractor first to secure its load of gravel. Cement then is placed on the gravel and the tractor proceeds to the sand loader, where it receives its proper measure of sand. Having thus received a charge for a complete mix, the tractor proceeds to the mixer and dumps its load into the elevating skip. A layout of this nature results in the cement being sandwiched between the two heavier materials, eliminating to a great extent the cement dust usually experienced when dumping into the mixer. A 21-cu.ft. motor-driven Chain Belt Company concrete mixer of the latest type, mounted on rubber-tired wheels, is used for preparing the aggregate. The mixture is made fairly dry and is placed on the roadbed by means of a bucket traveling on the mixer boom.

Leaving the mixer, the concrete, which is of 1:2:3½ mix of a dry consistency, is hand-tamped and shoveled into the crevices around the rails and ties. The first layer of concrete is placed to within 2½ in. of the finished top for a distance of about 30 ft. Wire mesh reinforcement is then rolled out into place and the mixer backs up and places the 2½-in. finish surface. The steel tie rods, in general, serve as forms to gage the height of the first level of concrete and act in a way as reinforcing bars, the wire mesh being laid on top of the tie rods. American Steel & Wire Company's 0.058 steel mesh is used for the reinforcement.

The flangeways along the gage side of the rail are formed by laying metal-protected beveled wood strips of the proper shape, which are left in place until the finishing work is well under way. A design is being worked out for a finishing machine which will strike off the concrete, tamp, finish and form the grooves all at the same time. This will still further eliminate hand labor. The curing of the concrete is accomplished by placing a layer of sand over the finished surface and keeping this wet for several days. More recently the company has been trying out the use of a silicate of soda solution for curing, apparently with good results.





Left—Concrete Mixer in Working Position Ready to Receive Charge. Right—Special Forms Used Where Granite Header Blocks Are Employed for Flangeways

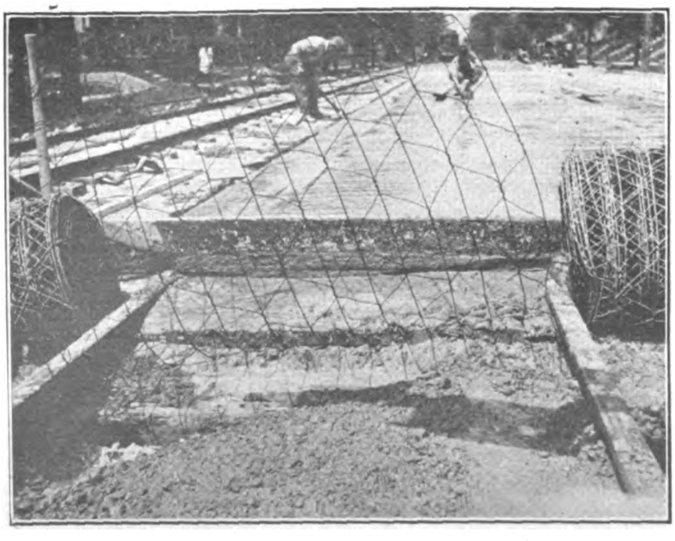
The track being laid in Milwaukee is of the rock ballast type, having 8 in. of mechanically tamped rock ballast under the ties and sufficient ballast between ties to bring it up to within 2¾ in. of the top surface. A 7¼-in. 102-lb. plain girder rail, Lorain section No. 516, is carried on 6 x 8-in. x 7-ft. hewn yellow pine ties spaced at 24-in. centers. A shoulder tieplate is used and ¾-in. screw spikes. Steel tie rods are placed every 6 ft. and serve to maintain the gage as well as reinforce the concrete. For ordinary street crossings, the 4-in. sloping flangeway provides a not objectionable crossing for vehicular traffic. However, at boulevard intersections a granite header is used which has a 2-in. flangeway cut in one corner the depth of the rail head. Suitable wooden forms are provided in a special case of this kind to prevent the concrete being carried up against the rail. These are constructed of 1-in. material braced every few feet. The rock ballast is excavated a few inches between the ties at the point where the granite header is to be placed in order that a 6-in. thick concrete base may be provided for the header. In the case of a certain boulevard, 150 ft. of granite headers were required per rail. This portion of the work requires an extra amount of time and labor, but is encountered at only a few points in the city.

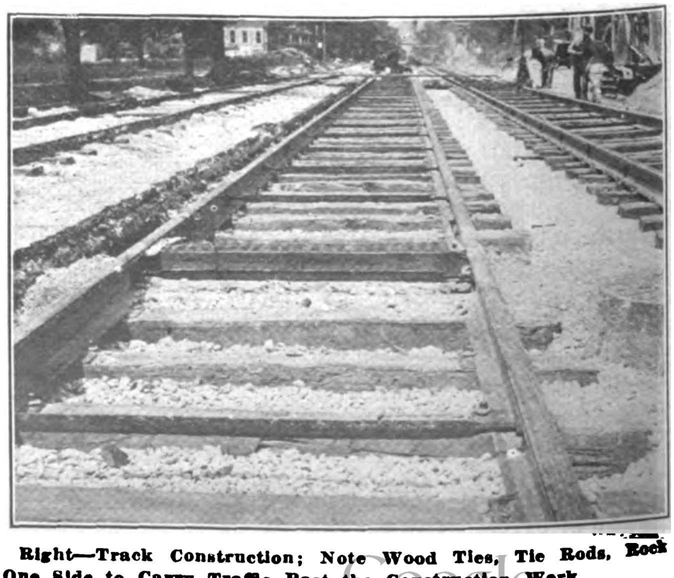
Thermit welded joints are used, a portable track grinder being used to smooth the surfaces.

In general, the concrete paving gang consists of twenty-three men, including equipment operators, working nine hours per day. Approximately 500 sq.yd. of concrete pavement is laid and finished per day. It is expected, through the substitution of additional equipment as described above, further to reduce the man-hours on this class of work.

The Milwaukee company was at first reluctant to adopt concrete as a substitute for stone blocks for track zone pavement, due to the difficulty of opening up concrete pavement when track repairs are needed. With the development of the use of air tools and air equipment, however, the difficulties of making repairs in concrete pavement became less, so in 1919 the company laid its first experimental sections of concrete pavement. This was found to be satisfactory in every way and met with the approval of the municipal authorities wherever tried out. So the use of concrete pavement has been greatly extended since that time. During the season of 1923 approximately 50,000 sq.yd. will have been laid, forming about 70 per cent of the track zone paving work done by the company in that period. At the end of 1923 about 18 per cent of all track zone pavement in Milwaukee will be concrete.

The company is also laying this year certain experimental sections of pavement finished with the so-called "Vitrolithic" process to test out this pavement in comparison with the reinforced concrete.





Left—Wire Mesh Reinforcing Placed 2½ In. Below Finished Surface. Right—Track Construction; Note Wood Ties, Tie Rods, Rock Ballast and Track Drain. A Temporary Track Is Laid at One Side to Carry Traffic Past the Construction Work

Wheel, Gear and Axle Practice—III

Grinding of Chilled Wheels Done by Pit and Floor Grinders and Abrasive Brakeshoes—Gaging of Wheels for Wear and Rotundity Important—Proper Inspection Insures Removal of Axles Before Failures—Axles Are Straightened by Hot or Cold Processes

PREVIOUS articles in this series giving information obtained from a survey of the wheel, gear and axle practice in use at sixty representative railway shops were published in the ELECTRIC RAILWAY JOURNAL for Aug. 18 and Oct. 27, 1923. Information has been given in regard to mileage obtained, conditions that limit life, methods used to increase mileage, shop arrangement, storage, and method of handling material to and from machines. In this, the third and last article of the survey, the maintenance of chilled iron wheels is discussed, together with maintenance methods and machines used for axle work.

Gaging Wheels in a 300-Ton Hydraulic Wheel Press at the Sullivan Square Shop of the Boston Elevated Railway

OF THE SIXTY electric railways from which information was obtained by personal visits in making this survey, approximately half were using chilled-iron wheels. Ten companies were using both steel and chilled-iron wheels. The most of these used steel wheels in interurban service and iron wheels in city service.

One of the principal differences in shop equipment, where chilled-iron wheels are used exclusively, is that a wheel lathe is not required, as the general practice is to grind the iron wheels. The methods and equipment used for grinding can be divided into three classes: First, where a pit grinder is used; second, where the equipment consists of a floor-type grinder, and third, where wheel-truing brakeshoes are used. In the information collected regarding methods of grinding wheels, the three types were used about equally.

Relative Advantages of Wheel Grinding Methods

A canvass was made to obtain information on the relative advantages of the three methods of grinding wheels, and opinions as to when the purchase of a wheel grinder would be warranted. The majority of master mechanics seem to think that on roads having 100 pairs or more of cast-iron wheels the economies obtained would pay interest on the investment in a grinder. Individual opinions varied, however, from a minimum of fifty pairs of wheels to a maximum of 500 pairs. Of course, wheel grinders are obtainable at various prices, depending upon the degree of efficiency, and a selection should be made so as to purchase a grinder commensurate with the actual requirements of the railway.

Electric railways using wheel-truing brakeshoes are obtaining very beneficial results, particularly where the flat spots are small. The great advantage in their use is that the wheels are ground without removing cars from service. It appears, however, that large flat spots cannot be ground out satisfactorily with this method, and some master mechanics have complained about the attention necessary to compensate for the increased coefficient of friction, lest additional flat spots develop. They also find that wheel-truing brakeshoes do not leave the wheels concentric with the journal and that the method is slow as compared to pit or floor type grinders. Several master mechanics stated that they would not know how to handle the flat wheel situation, particularly in winter months, without the use of these shoes.

The main advantage of the pit grinder as compared with the floor-type grinder lies in the saving of expense in jacking up cars, removing and replacing wheels, and handling wheels in and out of the grinder. There is also a reduction in time that the car is withheld from service. Some of the disadvantages given are that the pit grinder does not produce as satisfactory a job as the floor-type grinder, that the wheel treads are not ground concentric with journals and that the driving machinery is in the way of pit work.

The question of the rigidity of the grinder has quite an important bearing upon the results obtained. Some master mechanics feel that a sufficiently rigid construction could not be obtained from a pit grinder and for that reason the floor-type grinder is best. Many roads grind their wheels before placing them in service, and of course in this case the floor-type grinder is of advantage.

The opinions expressed by some of the men responsible for wheel maintenance are of interest. F. P. Maize, master mechanic of the Portland Railway, Light & Power Company, Portland, Ore., uses pit grinders, as he found it impossible to grind out flat spots successfully with abrasive brakeshoes. This road has a large number of steep grades and as a result considerable trouble is experienced from flat spots. Mr. Maize felt that the advantages of a pit wheel grinder lie in the fact that the wheels do not have to be removed from the car in order to grind them, and there is less expense from changing wheels and less delay in returning the cars to service.

Shop men at Norfolk, Va., find the use of grinders for establishing the rotundity of cast-iron wheels more satisfactory than the use of wheel-truing brakeshoes. With the wheel grinder, the character of the work is absolutely predetermined, and it can be turned out in its most efficient manner. Good results are obtained from wheel-truing brakeshoes if they are watched carefully, and their particular advantage is on roads which are not provided with wheel grinders. At Norfolk, where special shoes are installed in place of the regular shoes for the purpose of grinding out flat spots, particular regard is given to the increased coefficient of friction and the brake leverage is proportioned accordingly. The floor type of grinder is favored at Norfolk, due to its convenience for handling the initial grinding of new wheels prior to their installation. With the shop grinder any number of cars may be jacked up at one time and the wheels of these cars ground more rapidly and slightly more accurately than with the pit grinder, while with the latter a car must be shifted and a new car run in place before additional wheels can be ground.

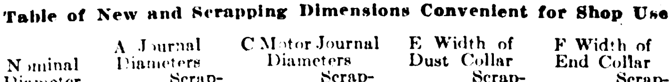


Table of New and Scrapping Dimensions Convenient for Shop Use

Nominal Diameter of Axle	A Journal Diameters New	A Journal Diameters Scrapping	C Motor Journal Diameters New	C Motor Journal Diameters Scrapping	E Width of Dust Collar New	E Width of Dust Collar Scrapping	F Width of End Collar New	F Width of End Collar Scrapping
6½ in.	5 in.	4½ in.	6½ in.	6¼ in.	2 in.	1¾ in.	⅞ in.	⅜ in.
6½ in.	5 in.	4¼ in.	6½ in.	6⅛ in.	2 in.	1¾ in.	....	....
5¾ in.	5 in.	4¼ in.	....	....	2 in.	1¾ in.	....	....
5 5/16 in.	4½ in.	3¼ in.	....	....	2½ in.	2¼ in.	⅞ in.	⅜ in.
6 in.	4½ in.	3¾ in.	6 in.	5¼ in.	2½ in.	2¼ in.	⅞ in.	⅜ in.
6 in.	4½ in.	3¾ in.	6 in.	5⅛ in.	2 in.	1¾ in.	⅞ in.	⅜ in.
5 5/16 in.	4½ in.	3¾ in.	....	....	2 in.	1¾ in.	⅞ in.	⅜ in.
5 in.	4 in.	3½ in.	5 in.	4¼ in.	2½ in.	2¼ in.	....	....
5½ in.	4¼ in.	3¾ in.	5½ in.	5¼ in.	2 in.	1¾ in.	⅞ in.	⅜ in.
5½ in.	4¼ in.	3¾ in.	5½ in.	5⅛ in.	2 in.	1¾ in.	⅞ in.	⅜ in.
4½ in.	3½ in.	3⅛ in.	....	....	1 13/16 in.	1 9/16 in.	....	....
6½ in.	5½ in.	5¼ in.	6½ in.	6⅛ in.	2 in.	1¾ in.	⅞ in.	⅜ in.

An important adjunct in connection with any wheel grinder is some provision for removing or caring for the dust removed from the wheels. Several railways are using an exhaust ventilating system to good advantage. This improves working conditions considerably, so that the job does not become so annoying or unfavorable for the workmen.

Some shops find economy in keeping a number of spare axles with wheels mounted, and replace any defective wheels immediately. The defective wheels can then be ground in the shop grinder at most convenient and economical times. Roads having a large number of cast-iron wheels can use this method to particular advantage, as the grinders can be kept in use almost continuously.

The Portland Railway, Light & Power Company uses pit and floor type grinders. Wheels are ordinarily ground with the pit grinders after about 5,000 miles of service, and as the cast-iron wheels average 60,000 miles, each wheel will normally be ground twelve times during its life. The floor type grinder is used for grinding wheels which are out of service and for grinding wheels mated on the same axle.

INSPECTION AND GAGING OF WHEELS

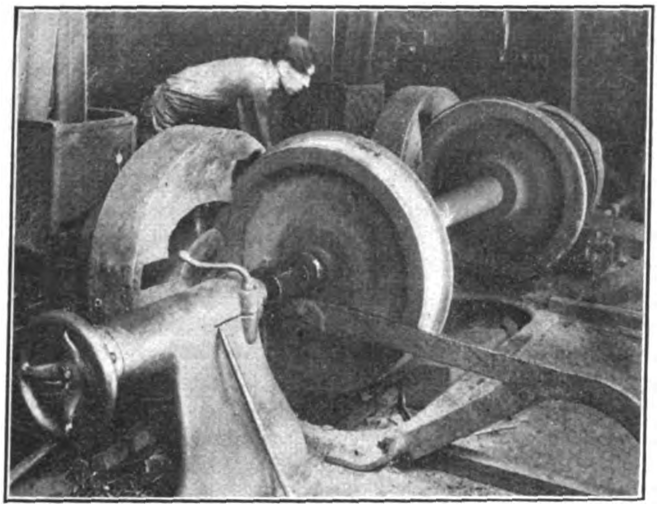
The American Electric Railway Engineering Association has standards for wheel mounting and track gages as well as plain and rotundity gages for steel wheels. Most electric railways use these standards or a modification of them to suit their particular condition. The standard gage is provided with a pointer for the center line of the axle, so that wheels are located from this center line as well as being located the proper distance apart. Several roads use the "back to back" method for gaging the wheels, in which the distance between the inner faces is determined with a pin gage. They report that this proves entirely satisfactory on their particular railways.

In general wheels are inspected at the same time as other parts of the car equipment. Some roads rely upon the judgment of the man making the inspection as to whether wheels require grinding or turning. Most roads, however, provide their shop men with standard wheel gages giving the proper contour for flange treads, and these are used on regular inspection. Where improper wear occurs, attempts are made to correct it. Methods of doing this were discussed in the first article of this series, which was printed in the Aug. 18 issue.

The British Columbia Electric Railway, Vancouver, B. C., which uses steel wheels exclusively, has an inspector who goes from carhouse to carhouse inspecting wheels. The plan of the company is to have wheels watched so closely that it is never necessary to shop a car for wheels alone. The company finds that by proper attention the work can be done at times when the car is in for regular overhauling, which comes about six times in the life of a steel wheel. Occasionally a new wheel is run beyond its time limit and then is scrapped as under diameter, rather than to shop the car just to save the wheel. Standard gages are used and the spacing of wheels is checked at four places on the rim and hub.

The Kansas City Railways reports that its practice in connection with steel wheels is to gage the contour and flange of the wheels with templets. The minimum thickness of flange allowed is 13/16 in., and 5/16 in. the maximum tread wear. With a wide tread wheel in city service, the tread becomes concave or what is commonly termed rail worn. Wheels are carefully inspected and finally passed upon as to whether they are to be scrapped or reclaimed by the foreman in charge of the wheel shop.

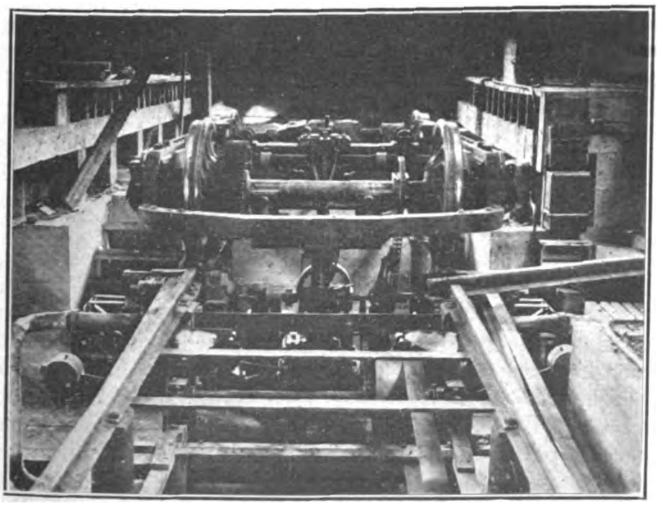
The operating companies in Brooklyn, N. Y., are using an automatic device to indicate when wheels are worn to their minimum diameter. On account of unusual conditions of the elevated lines, the underneath clearances between bottoms of gear cases and motor



Grinding Out Flat Spots at the Sullivan Square Shop of the Boston Elevated Railway

shells and the top of switch housings, as well as other special trackwork, are very scant. Maximum permissible clearances were determined from a careful study made by all departments concerned, and from this the diameters for wheel removal were specified. In order to simplify the work of checking and seeing that wheels are not allowed to wear beyond these limits, electrical telltales are installed at the head of each track in the three elevated inspection shops. Every car, on entering or leaving the inspection shop, must pass over these telltales. If the predetermined clearances for the motors and gear cases are not present, a bell is automatically rung. As the cars are ordinarily run over the pit made up in trains, the location of the exact part of the particular car which caused the action of the telltale is essential. To accomplish this, the tops of the telltales are whitewashed, and if a motor case strikes the top of this a portion of the whitewash remains on it so as to show readily on inspection.

An engineer of a large company manufacturing car wheels, who considers the gaging of wheels very important, considers the only proper way to gage a wheel is from the throat side of one flange to the back of the mate flange. Where the throat side of the flange is against the head of the outside rail of a curve or a frog, the back of the mate wheel should touch the guard rail. If wheels are so gaged it is stated that a much better flange can be worked out than can be obtained by gaging from the throat of one wheel to the throat of the mate.



Novel Type of Pit Grinder. Wheels Are Driven from Motor Located in Pit Through Chain and Sprocket

HOLLOW TREADS ARE OBJECTIONABLE

In gaging wheels some roads have a practice of measuring the amount that the wheel is worn hollow, but this practice is not very generally used. The reason for measuring the hollow wear is that when a wheel is sufficiently worn to allow the rim to project below the top of the rail, it is likely to receive blows from frogs and crossings. When the flange becomes so high that the apex is likely to strike the bottom of flangeways, it should be removed from service. Wheels that are excessively hollow are likely to damage tracks and crossings on account of the overhanging rim and of the high flange, which causes excessive pounding and rapid deterioration of the track at these points. Hollow wear is usually caused by running wheels which are wider than the top of the rail. Of course, if the rail were wide enough to cover the whole wheel tread, the wear should continue evenly.

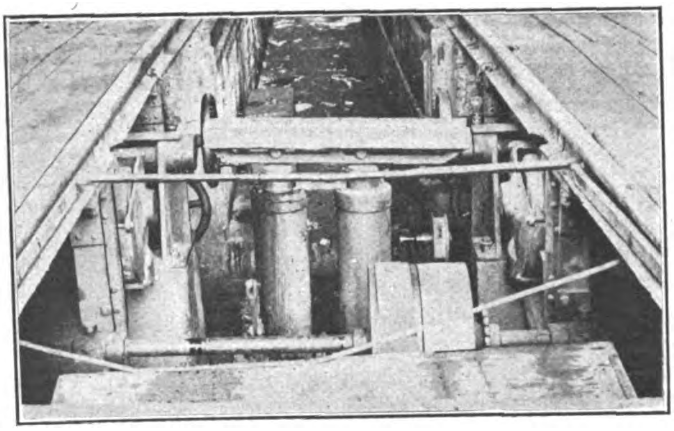
In regard to the amount that a wheel can be worn hollow, the M.C.B. Association proceedings for 1905 recommend that wheels be allowed to wear down ⅜ in. before they are condemned unless worn through the chill. Wheels originally having the ordinary taper can be worn ⅜ in. from the original contour at the throat before they can become worn 3/16 in. hollow. It is also evident that if the rim wears down, a total of more than ⅜ in. can be secured before the wheel is worn sufficiently to condemn it. It is also possible to modify the taper and especially the drop-off taper in such a manner that more than ⅜ in. wear can be secured before the wheel is 3/16 in. hollow.

A peculiar case of trouble from wheels wearing hollow was noted on one electric railway some time ago. This company used T-rails in open track construction, and laminated bonds soldered to the rail head were installed. Only a short time after the bonding was completed it was found that nearly all of the bonds were torn off or loosened. Investigation showed that this was caused by a wheel operating over the line whose tread was worn concave to such an extent that its outside portion struck the tops of the bonds and broke them off so that replacement was necessary.

RAILWAY AXLE PRACTICE

One of the chief problems in connection with electric railway axles is to determine when they have reached the end of their useful life. The principal reasons for removal are excessive wear and the occurrence of cracks or breaks. A few electric railways that are operating high-speed service are removing axles after they have reached a certain mileage limit regardless of appearance on inspection, experience having shown that axle breakage is most frequent after this point has been reached.

The British Columbia Electric Railway, Vancouver, B. C., has a practice of scrapping all axles when they have been in service for 250,000 miles. This company finds that proper inspection and tests for flaws or cracks cannot be made without removing the wheels expressly for that purpose. An epidemic of axle failures last year was traced to some tight gage track. This narrowing of the gage was caused by the swelling of wood

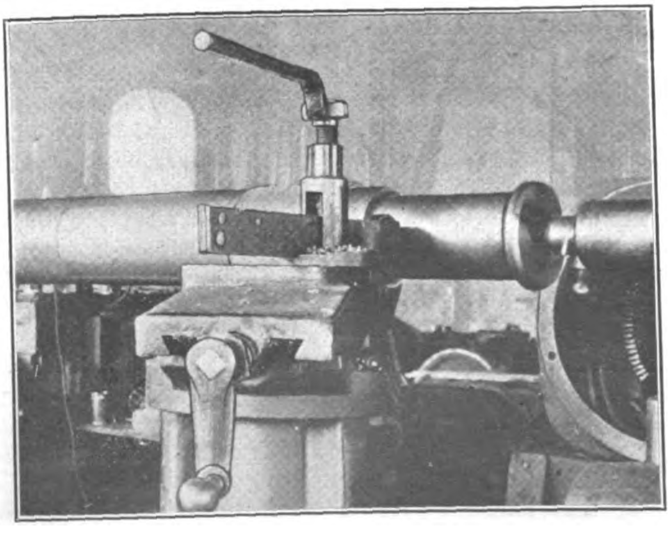


Pit Wheel Grinder Used in the Shop of the Des Moines City Railway

block paving on a bridge over which the cars operated. New axles are now being provided with reinforced wheel seats, and it is expected that a considerable improvement will result. Experiments made by this company with nickel-steel axles did not produce good results, although this steel had a higher tensile strength. It did not resist the effect of fatigue as well as the heat-treated axle ordinarily used. Many axle breaks were found to start at the corner of the keyway at the base of the drilled hole made to start the keyway cut. This has led to a change in the practice of cutting keyways, so that they are now milled at the end instead of being drilled.

The Puget Sound Electric Railway, Tacoma, Wash., stamps on the end of each axle the date that it is placed in service. After four years of service, all interurban axles are removed and annealed, regardless of the mileage which they have made. Careful inspection is made of wear and tests are made for flaws. Most of the broken axles on this system have occurred close to the wheel. The fillet at this point is tested for flaws or cracks by gouging up a groove in the fillet with a small diamond pointed chisel. If it traverses a flaw a square chip will be thrown off.

On the Portland Railway, Light & Power Company, Portland, Ore., when axle cracks are discovered in an incipient stage by a test, an attempt is made to turn the axle down below the depth of the crack. If this proves feasible, the roughly turned axle is annealed and is afterward finished by further turning to a smaller diameter.



Rolling an Axle Bearing Fit on Shaft in the Shop of the Chicago, Lake Shore & South Bend Railway

Many electric railways specify a wear allowance, and axles are either scrapped or turned down to smaller diameters when this wear has been reached. Twenty railways reported using this system, the wear allowances varying from 3/16 in. to ½ in. of diameter of bearing fit. An accompanying illustration shows the form of instructions which are sent to shops in Brooklyn for scrapping axles or removal for turning to smaller sizes.

Several electric railways report that they are following the rules of the Master Car Builders' Association. Rule 22 requires that axles broken or having seamy or pitted journals, fillets in the back shoulder worn out, or collars broken off or worn to ¼ in. or less, should be removed. Rule 23 prescribes limit of wear for different sized axles, and rule 24 provides for the removal of axles with cut journals, bent axles, or axles rendered unsafe by unfair usage, derailment or accident.

ROUGH MACHINING CAUSES AXLE FAILURES

Axles are usually received in the rough state from the manufacturers and are finish-turned in the railway company's shops. Careful machining is most essential, as many failures have been traced to bad machining. The radii of fillets should be maintained accurately, as a sharp corner or tool marks may defeat all the care used in the design and preparation of the axle. A roughly turned axle may be compared to a threaded bolt, the length and thickness of the thread being dependent upon the cut and speed used in the lathe operation. The lathe tool shears small particles of the material, so that a turned axle is in reality a sheared surface, from which small particles of steel have been torn away. Small gaps in the material are caused by the edges of the tool pushing away the layer of steel. When the distorted steel breaks, additional gaps are formed. These gaps lie along the axle, and in general across the direction in which the axle will be bent in service. The grooves lie in the direct line in which fracture is most likely to occur under working stress. Car axles, to give the best service, should have smoothly ground surfaces and be free from sharp angles and accidental notches or dents. Most electric railways know that the manufacturer is not responsible for all the ills which may occur to an axle, that careful machining after it is received is quite essential, and finally that periodical inspection of axles in service is most important.

TESTING AXLES FOR CRACKS

The general practice used by electric railways in testing axles for cracks is first to place the axle in a lathe and rotate it so that its trueness can be determined. After this a hammer test of some form is quite generally applied.

The test used by the Connecticut Company consists of painting the axle with a coat of black lead and oil over the entire surface. The axle is then wiped clean and again painted with a coat of white lead and oil, after which the axle is struck with an 8-lb. sledge on each end. If there are cracks, flaws, breaks or other defects the oil and black lead will show through the white paint. A large number of railways reported as using practically this same test except that the first coat of black lead and oil is omitted. Others report that if the axle is carefully cleaned and then struck several sharp blows on the ends with a sledge, the oil which remains in any cracks will be forced out and thus indicate the position of the crack. In this latter case no painting of the axle is done.

One railway reports a method of testing axles without removing the wheels. This consists of immersing the axle with wheels mounted in a tank of hot oil. After removal, the oil is carefully wiped off, and the axle is covered with whiting. The axle is then supported on a block at the center with the wheels hanging free, and is struck several blows with a heavy sledge. Wherever there is a crack, a fine thread of oil works up from the crack under the vibration, and can be seen against the white. Several roads report that they clean axles very carefully and then go over them with a magnifying glass.

A test used by the Empire State Railroad Corporation, Syracuse, N. Y., consists of taking a very fine cut with a sharp lathe tool over the section where the crack is most likely to develop. If the axle has a crack, it is then apparent to the operator.

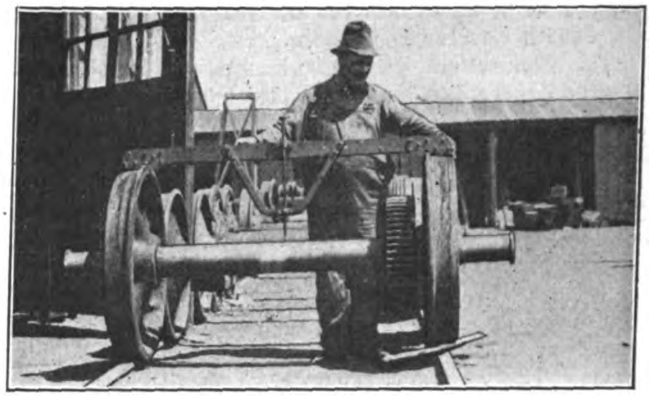
In discussing with master mechanics the question of what might be considered as a safe operating maximum mileage, opinions vary, depending upon service conditions, from 500,000 to 900,000 miles.

HOT OR COLD STRAIGHTENING OF AXLES AN OPEN QUESTION

The controversy as to whether it is best to straighten axles cold or heat them is a very active one, and the information collected in this survey indicates that opinions are about equally divided. There is no doubt that if axles are but slightly sprung, the best method is to straighten them cold, as this can be accomplished quite successfully with a proper axle straightening machine, and there is no danger of destroying the original properties of the steel through heat. Many railways find that mild heating does not injure the original properties to any great extent, and if cooled properly, that satisfactory results will be obtained.

The practice in Brooklyn is to straighten slightly bent axles cold, as it is believed that while the straightening process will cause further distortion of the fiber of the material and so tend to weaken the axle, there is probably less danger from this source than from heating, especially in the case of cold-rolled or heat-treated material, and where proper facilities are not available for re-treating the axle, so as to retain its original properties. The heating of axles of quenched, tempered, and cold-rolled material will affect the physical properties in amounts depending upon the degree of temperature and the rate of cooling. If heated above the critical point of the steel, about 700 deg. C., and then allowed to cool slowly, the result will be materially to reduce the strength with a slight increase in ductility. Annealed axles may be heated to the original annealing temperature, without seriously affecting the physical properties, provided care is taken in the heating and cooling processes.

F. R. Phillips, Pittsburgh, considers it the best practice to straighten axles cold, provided the straightening process does not require more than 10 tons pressure for a 5-in. axle. Heating of axles as usually carried out will change the original physical properties, and if it is necessary to heat cold-rolled or annealed, quenched and tempered axles to straighten them, they should be then restored by re-rolling, re-annealing, and re-treating, as the case may require, in accordance with the methods originally specified for this treatment.

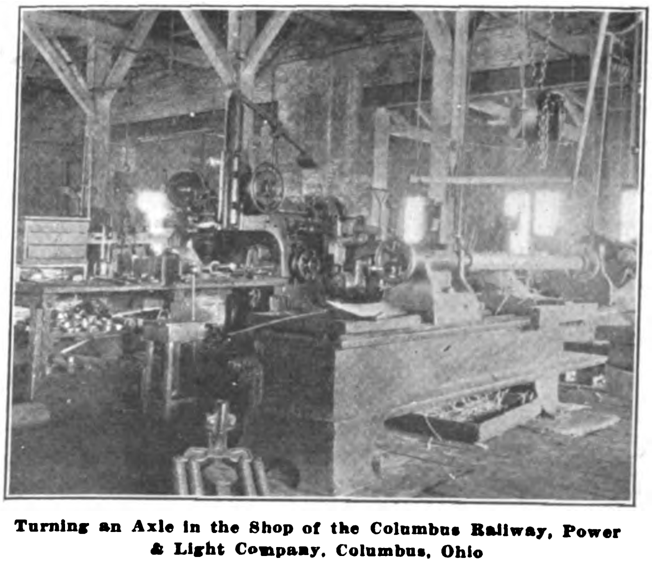

Type of Wheel Gage Used by the Waterloo, Cedar Falls & Northern Railway

Many railways follow the practice of straightening cold axles, which are bent only slightly, but when out of true to such an extent that this method cannot be done readily the axles are turned down to smaller sizes, or else scrapped.

The Portland Railway, Light & Power Company has had successful results from heating axles for straightening. It is considered better by this company to heat the axles to such an extent that there would be no danger of damage, taking particular care not to overheat them.

WELDING OF AXLES REGARDED WITH SUSPICION

The question as to whether it is advantageous to build up wheel, gear and bearing fits on axles by welding is another one on which there is considerable difference of opinion. Several railways have experienced trouble from breaking of the axles after they were built up, so that this practice has now been discontinued. Others apparently are obtaining quite satisfactory results. Where welding is practiced, the most general custom appears to be to lay the metal on longitudinally. In the shops of the Spokane United Railways bearing fits are built up. The metal is laid on longitudinally by covering first one-quarter of the circumference and then turning the axle 180 deg., where another weld is made. The axle is then turned back 90


Turning an Axle in the Shop of the Columbus Railway, Power & Light Company, Columbus, Ohio

deg., so as to fill in between the two layers, and finally the fourth quarter is filled in.

The Connecticut Company has built up axles to a limited degree, but has found that this seemed to make the material more brittle. Probably this condition is in part due to the fact that the metal is already somewhat fatigued. The company finds that there is no great economy in the practice, even if it proved mechanically desirable.

FINISHING BEARING SURFACES

Careful finishing of the bearing surfaces of axles has much to do with keeping bearing troubles to a minimum. The two principal methods used in electric railway shops, after the bearings are turned in a lathe, are to file and then polish with emery cloth and oil, and to roll the surface with a steel roller. Several roads report a considerable reduction in hot bearings after changing from the use of emery paper for polishing to the use of the rolling method. When finishing with a roller after the last finishing cut is taken on the bearing surface, the rolling tool is substituted in the lathe tool post for the cutting tool. The roller most commonly used is of about 2½ in. diameter and has either a flat or rounded face. Where a flat face is used, it is common practice to round off the corners. The roller is forced up against the bearing surface of the axle by means of the cross-feed screw of the lathe carriage and is run back and forth over the surface as it rotates, by using the regular lathe feed. In passing over the surface of the axle, the roller compresses the metal ridges left by the cutting tool and leaves a smooth, polished surface.

Loose gears are almost unheard of, now that railways are using the solid type. There are, however, quite a number of split gears still in use. The general tendency is also to press gears on axles without keys, although about half of the properties from which information was obtained still use keys with their gears. The pressure used for pressing on gears ranges from 15 tons to 80 tons, with the great majority of roads using approximately 50 tons. Many railways specify a pressure for pressing on gears in proportion to the diameter of the bore. This ranges from 4½ tons per inch diameter up to 10 tons per inch. For the convenience of the shop men many railways have prepared charts of pressures for pressing on in proportion to the diameter of the axle. For example, the Puget Sound Electric Railway, Tacoma, Wash., keeps the pressures within the following specified limits: for 3½-in. axles, 30 to 40 tons; 4-in. axles, 35 to 45 tons; 4½-in axles, 40 to 50 tons; 5-in. axles, 45 to 55 tons; 5½-in. axles, 45 to 60 tons; 6-in. axles, 50 to 65 tons. It is stated that danger of springing axles is avoided when the pressures are kept within these limits.

The question as to whether the finished diameters for the gear fits of axles and the finished bores of axles could be specified was discussed with operating men on several properties. Most of them seemed to feel that it would be safer to continue the practice of specifying the pressures at which gears should be pressed on, although some felt that diameters of bore with tolerances could be worked out which would be satisfactory. The Kentucky Traction & Terminal Company, Lexington, Ky., has been using for its gears 0.001 in. under size bore per inch of diameter, to allow for press fit, and has been obtaining very uniform pressure for pressing gears on.

Enameled Signs Prove to Be Economical

THE use of enameled signs to mark trolley stations, section insulators, private rights-of-way has proved to be so satisfactory in Brooklyn that no other type is now used. It was formerly the practice to designate stops, etc., by painted signs of wood or sheet iron. A number of years ago it was decided to try enameled signs. While such signs cost a little more in the first place than painted signs, they last so much longer that they are more economical in the end. Paint will wear off a painted sign or become dimmed by weather or dirt in a few years, whereas the enameled sign will last indefinitely unless it is subjected to some severe blow, such as that from a wild trolley pole, which chips off the enamel.

When the sign becomes so dirty that the lettering begins to appear faint, it is an easy matter to wipe it off with a rag soaked in kerosene and restore the original freshness. Where a large enameled sign is attached to a tubular steel pole or to a column of the elevated railway structure, it is slipped into an iron frame, and to prevent the wear that might occur between the sign and its frame, thin pieces of rubber are placed between the two surfaces.

Cold Paving Patch Saves Money

ALTHOUGH the Beaver Valley Traction Company, New Brighton, Pa., first tried the use of a cold paving patch with the idea that it was only a temporary expedient, it has proved so satisfactory that the company is now using this method widely in New Brighton, Rochester and Freedom. Throughout this territory brick paving predominates, and small repairs often entailed considerable expense when it was necessary to take up the old brick. With the cold patch method none of the old brick is taken up. Limestone, sand and oil are prepared in a concrete mixer and hauled to the desired location, where the patch is made without any interruption to traffic. The oils used have been Tarvia and Texaco and both have given satisfactory results. The estimated cost is about 80 cents per square yard, as shown in the accompanying table. Vehicles are not closed off at any time, but are allowed to run over the cold patch as soon as it has been installed. No detrimental effect has been noticed from this practice.

The various communities through which the railway operates have expressed their approval of this method of repairing the pavement and have been agreeable to the extension of its use rather than urging more permanent repairs. The accompanying figures show the cost of this kind of patching.

COST OF PREPARATION AND INSTALLATION OF COLD PATCH FOR PAVING REPAIRS

Material		
1 ton limestone	$2.30	
½ ton sand	0.30	
Tarvia, 16 gal. at 20 cents	3.20	
Gasoline	0.15	$5.95
Mixing		
Labor, fifteen hours at 45 cents	6.75	
Supervision, five hours	4.50	11.25
Installation		
Labor, forty hours at 45 cents	18.00	
Supervision, twenty hours	18.00	36.00
Grand total		$53.20

One cubic yard of material will cover approximately 66⅔ square yards. This is at the rate of 80 cents per yard.

Car Mileage Records with a Posting Machine

Plan Adopted in Toronto Based on Use of a Bookkeeping Machine Gives Cumulative Mileage for Each Car and Group—Original Records Made on Perforated Sheets Are Torn Apart and Assembled by Car Numbers to Get Individual Records — Wheel, Axle, Motor and Gear Mileage Also Obtained—One Machine Posts Records for 970 Cars Within One Day's Time

A NEW method of determining individual car mileage has been developed by the Toronto Transportation Commission, making use of a Burroughs posting machine, the addition and printing being done automatically. The use of this method has simplified greatly the detailed work of obtaining individual or group car mileage records, and the distance covered by the equipment between any two dates is obtained merely by subtracting the cumulative figures. The results also are applicable to determine the mileage of all parts of the equipment, such as motors, gears and pinions.

The following description outlines in detail the method employed in obtaining the original data and in working it up to give the final record. The system has been developed under the supervision of W. R. McRae, superintendent of rolling stock.

The mileage of the individual car is based on the route schedule, which is of standard form, giving the run for each crew and the corresponding trips and mileage for the day's work. The car assigned to each run is listed on the "Daily Record of Cars in Service," Form D-63 (No. 5 in the illustration on page 856), by a clerk at the carhouse. Spaces are provided on this form so that if more than one car is assigned to a run, as for instance happens when it is broken into several sections that cover parts of the day only, the full information will be recorded. It will be noticed that for the Yonge Street line several car numbers are shown for each run number. This is because the motor cars, which are in service all day, have trailers attached to them during the rush hours.

The information of the daily record of cars in service is confirmed by the "Motorman's Signing-in Sheet," Form D-35. On this the motorman at the end of his work records the run number, car number, time in and condition of the car. In case a car has to be replaced during the run, this information is recorded for the division on Form D-22, "Car Change" (No. 2 in the illustration), on which the route, run number, time and cause of the change are given, in addition to the numbers of the cars involved.

The next form is the first one which is distinctive to this method of calculating car mileage, those already described being similar to forms used elsewhere. This form, X-3, known as the "Daily Record of Cars and Wheel Mileage," both sides of which are reproduced on page 857, is made out in the offices of the divisional superintendents, the run number, car number, time out, time in, miles lost and miles run being entered. The distinctive feature of this form is that the thirty sections on the sheet are separated by perforations so that they may be detached individually. Each section bears a code letter in its lower left-hand corner which indicates the division. When the form is filled out each of the sections will contain a car number with the other information for determining mileage. In case of a change-off a new ticket is filled out for the car making the change, thus giving a ticket for each individual car on every run. In the event of error it is necessary to know not only the division but the route and date, so that each section of the form is marked on the back with a number in Roman numerals, representing the route, and the date in Arabic numerals. This is done easily and quickly by means of roller self-inking rubber stamps.

Passenger cars are divided into groups according to type and equipment. Service cars, motor buses and trolley buses are similarly separated into groups. The sections of the form are separated on the perforations and are sorted according to car number, then being made up into bundles, each of which has car numbers corresponding to a single group of cars.

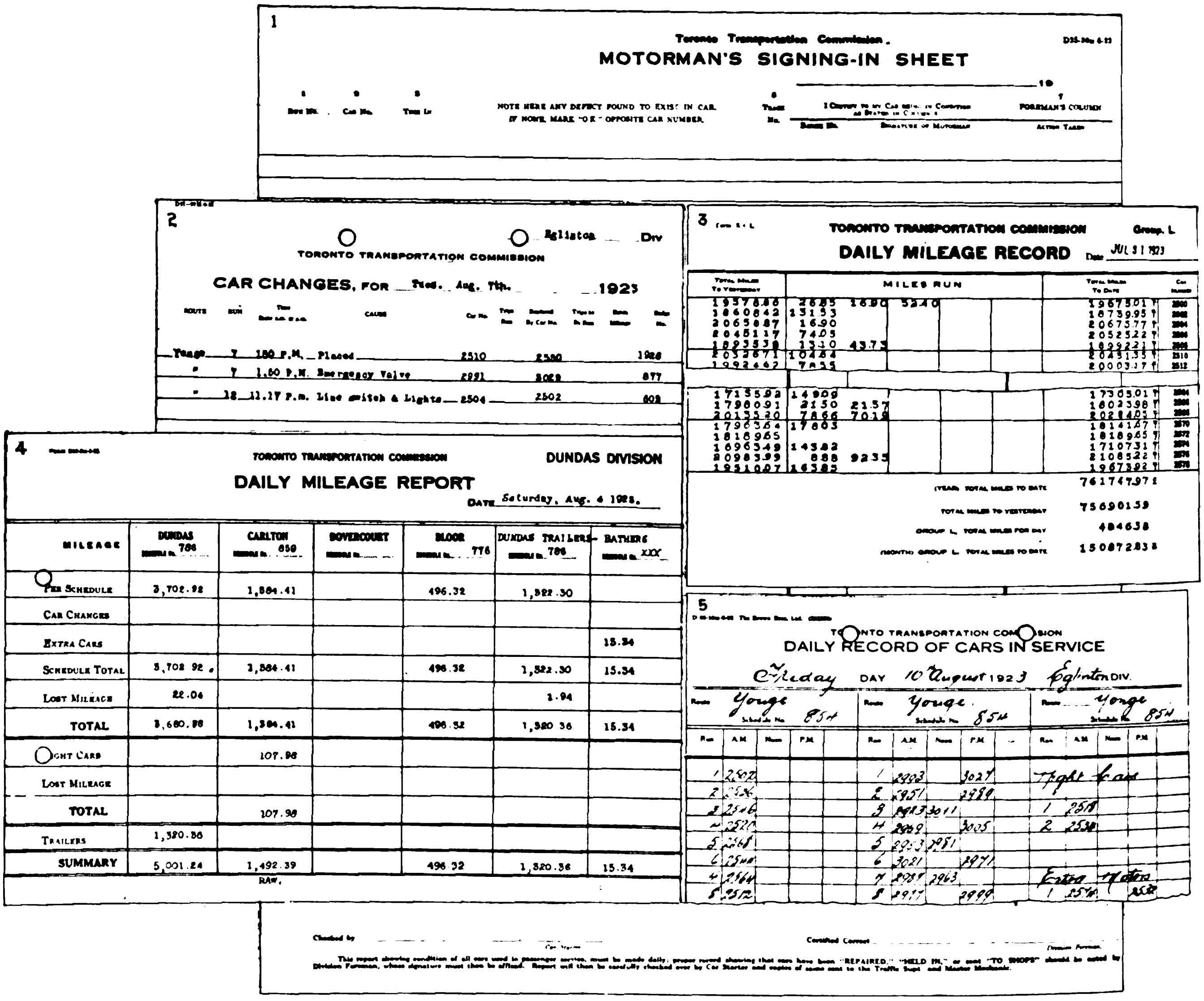
From the above it is seen that the tickets contain all the information necessary for the record, consisting of the date, division, route, run number, car number, time out, time in, miles lost and miles run.

Accompanying the "Daily Record of Cars and Wheel Mileage" is the "Daily Mileage Report," Form D-10, on which route mileage and divisional mileage are reported. This is made up from the scheduled mileage, by adding the miles for extra cars or trips not scheduled, and subtracting mileage lost.

THE MILEAGE CALCULATION IS MADE BY MACHINE

The mileage shown on the small slips is then posted on the "Daily Mileage Record," Form X-4 (No. 3), by a Burroughs type 2406 split-platen posting machine with an automatic carriage. In order to facilitate the operation, the sheet for the previous day and the sheet to be posted are placed together in the machine, so that the column headed "total miles to date" on the record for the previous day shows to the right of the new sheet. This simplifies the work of transferring the amounts from one sheet to the other and minimizes the chance for error. When an error is made it may be detected easily by comparison and by checking the sheet totals.

The daily mileage record for the entire system is placed on thirty-five of the sheets. The car numbers are printed in the right-hand column, being segregated by groups of equipment. Group L, for instance, consists of forty cars, numbered from 2500 to 2578, which are all of the same type and are all equipped with English Electric DK-83 motors.



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Toronto Transportation Commission

MOTORMAN'S SIGNING-IN SHEET

_______________ 19__

1 Run No.	2 Car No.	3 Time In	4 NOTE HERE ANY DEFECT FOUND TO EXIST IN CAR. IF NONE, MARK "O.K." OPPOSITE CAR NUMBER	5 Train No.	6 I Certify to my Car being in Condition as Stated in Column 4 — Badge No.	Signature of Motorman	7 Foreman's Column — Action Taken

2

Eglinton Div

TORONTO TRANSPORTATION COMMISSION

CAR CHANGES, FOR Tues. Aug. 7th. 1923

Route	Run	Time Date a.m. or p.m.	Cause	Car No.	Trips Run	Replaced By Car No.	Trips to Be Run	Sched. Mileage	Badge No.
Yonge	7	150 P.M.	Placed	2510		2550			1926
"	7	1.60 P.M.	Emergency Valve	2991		3029			877
"	12	11.17 P.m.	Line switch & Lights	2504		2502			602

3 Form S-L

TORONTO TRANSPORTATION COMMISSION Group. L

DAILY MILEAGE RECORD Date JUL 31 1923

Total Miles To Yesterday	Miles Run	Total Miles To Date	Car Number
1957886	2685 1690 5240	1967501	2500
1860842	13153	1873995	2502
2065887	1690	2067577	2504
2045117	7405	2052522	2506
1893530	1310 4375	1899221	2508
2032671	10464	2043135	2510
1992462	7855	2000317	2512
1715592	14909	1730501	[illegible]
1798091	2150 2157	1802398	[illegible]
2013520	7866 7019	2028405	[illegible]
1796364	17803	1814167	2570
1818965		1818965	2572
1696349	14382	1710731	2574
2098399	888 9235	2108522	2576
1951007	16385	1967392	2578

(YEAR) TOTAL MILES TO DATE 761747971

TOTAL MILES TO YESTERDAY 75690139

GROUP L. TOTAL MILES FOR DAY 484638

(MONTH) GROUP L. TOTAL MILES TO DATE 150872838

4

TORONTO TRANSPORTATION COMMISSION DUNDAS DIVISION

DAILY MILEAGE REPORT

DATE Saturday, Aug. 4 1923.

MILEAGE	DUNDAS Schedule No. 786	CARLTON Schedule No. 659	BOVERCOURT Schedule No.	BLOOR Schedule No. 776	DUNDAS TRAILERS Schedule No. 786	BATHERS Schedule No. XXX
Per Schedule	3,702.92	1,884.41		496.32	1,322.30	
Car Changes						
Extra Cars						15.34
Schedule Total	3,702.92	1,884.41		496.32	1,322.30	15.34
Lost Mileage	22.04				1.94	
TOTAL	3,680.88	1,384.41		496.32	1,320.36	15.34
Night Cars		107.98				
Lost Mileage						
TOTAL		107.98				
Trailers	1,320.36					
SUMMARY	5,001.24	1,492.39		496.32	1,320.36	15.34

RAW.

5

TORONTO TRANSPORTATION COMMISSION

DAILY RECORD OF CARS IN SERVICE

Friday DAY 10 August 1923 Eglinton DIV.

Route Yonge Schedule No. 854				Route Yonge Schedule No. 854				Route Yonge Schedule No. 854			
Run	A.M.	Noon	P.M.	Run	A.M.	Noon	P.M.	Run	A.M.	Noon	P.M.
1	2502			1	2993		3027	Night Cars			
2	2536			2	2951		2989				
3	2546			3	2913	3011		1	2518		
4	2520			4	2969		3005	2	2530		
5	2568			5	2953	2981					
6	2544			6	3021		2971				
7	2564			7	2989	2963		Extra Motors			
8	2512			8	2917		2999	1	2546		2532

Checked by ______________ Car Starter

Certified Correct ______________ Division Foreman.

This report showing condition of all cars used in passenger service, must be made daily; proper record showing that cars have been "REPAIRED," "HELD IN," or sent "TO SHOPS" should be noted by Division Foreman, whose signature must then be affixed. Report will then be carefully checked over by Car Starter and copies of same sent to the Traffic Supt. and Master Mechanic.

Some of the Principal Forms Used in Toronto Mileage Record System

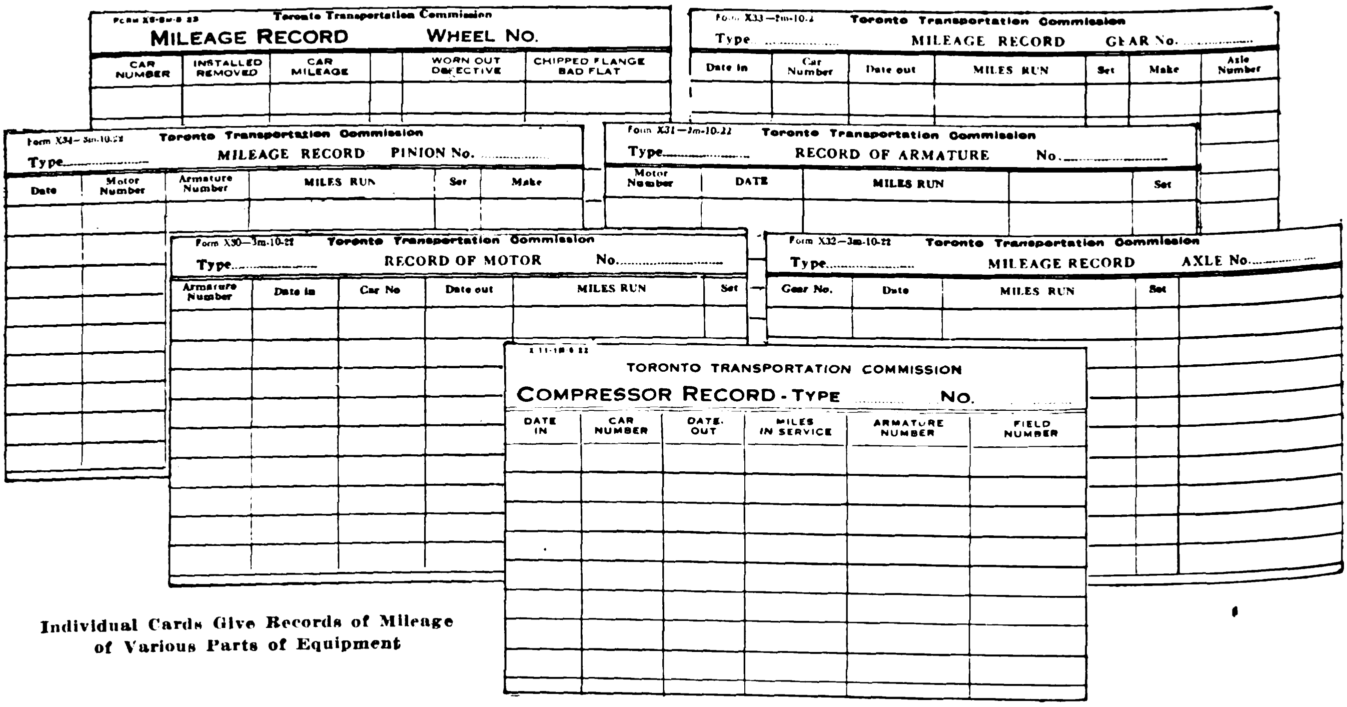
No. 1—Each motorman must certify to the condition of his car when ending work for the day.

No. 2—When cars are changed it is indicated on this form.

No. 3—The daily mileage record is printed automatically by the posting machine.

No. 4—The route mileage is furnished by the division superintendent, with scheduled mileage and variations therefrom to give the actual car miles run for the day.

No. 5—The daily record of cars in service is made up from information on the time table.



Toronto Transportation Commission

MILEAGE RECORD WHEEL NO.

CAR NUMBER	INSTALLED REMOVED	CAR MILEAGE		WORN OUT DEFECTIVE	CHIPPED FLANGE BAD FLAT

Form X33—2m-10-22 Toronto Transportation Commission

Type .... MILEAGE RECORD GEAR No. ....

Date in	Car Number	Date out	MILES RUN	Set	Make	Axle Number

Form X34—3m-10-22 Toronto Transportation Commission

Type .... MILEAGE RECORD PINION No. ....

Date	Motor Number	Armature Number	MILES RUN	Set	Make

Form X31—3m-10-22 Toronto Transportation Commission

Type .... RECORD OF ARMATURE No. ....

Motor Number	DATE	MILES RUN		Set

Form X30—3m-10-22 Toronto Transportation Commission

Type .... RECORD OF MOTOR No. ....

Armature Number	Date in	Car No	Date out	MILES RUN	Set

Form X32—3m-10-22 Toronto Transportation Commission

Type .... MILEAGE RECORD AXLE No. ....

Gear No.	Date	MILES RUN	Set

TORONTO TRANSPORTATION COMMISSION

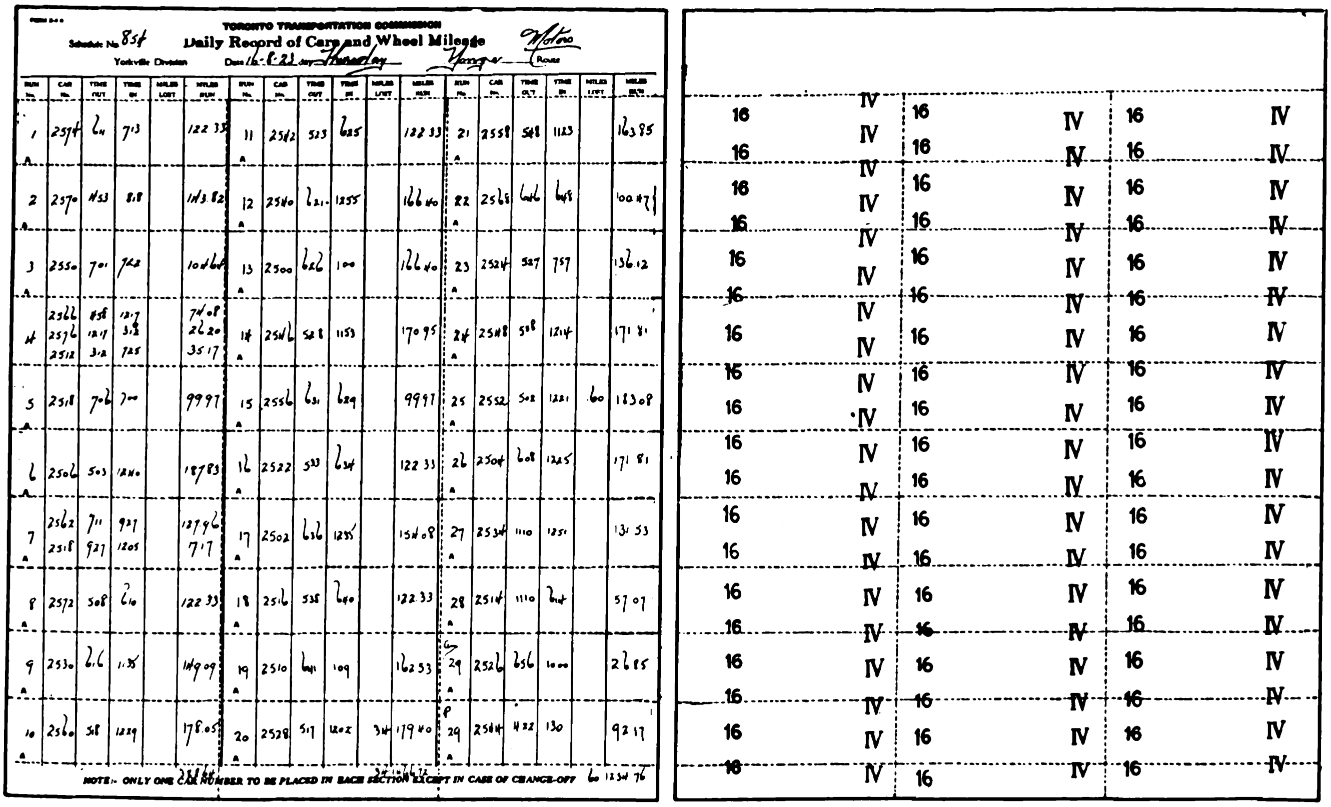
COMPRESSOR RECORD - TYPE .... NO. ....

DATE IN	CAR NUMBER	DATE OUT	MILES IN SERVICE	ARMATURE NUMBER	FIELD NUMBER

Individual Cards Give Records of Mileage of Various Parts of Equipment

As the cumulation is computed from Jan. 1 to Dec. 31 of each year the mileage must be added on each day, the record for July 31 being taken as an illustration. The "total miles to yesterday" is transferred from the similar sheet for the day before, which gets the previous mileage into the adding wheels of the machine. To this is added the mileage for the current day, as shown on the small slips which have been sorted out by car numbers. For instance, the mileage previously recorded for car 2500 (up to July 30) was 19,578.86. This car made three trips July 31, with mileage of 26.85, 16.90 and 52.40, the sum representing the run of the car for the day. These figures are set up by the operator and added automatically as printed, after which the total miles including July 31, or 19,675.01, is printed as a subtotal.

The total miles run by Group L is shown at the bottom of the sheet, the "(Year) Total Miles to Date," 761,749.97, being the summation of the group car mileage from Jan. 1 to July 31, inclusive. This is carried on a separate set of adding wheels from those giving car totals and is totaled and printed automatically by the machine. From this the total miles to the day before, 756,901.59, is subtracted, giving the miles for Group L for the day as 4,846.38. The total miles for the month to date for Group L is obtained by adding to the day's figures the group miles for the previous day. Since the sheet shown is for July 31, the total miles for the month to date, 150,872.83, represents the mileage for the month of July for the group. Taking off the similar items from each of the thirty-five sheets gives the monthly mileage for the system.


TORONTO TRANSPORTATION COMMISSION
Daily Record of Car and Wheel Mileage
Yorkville Division
NOTE— ONLY ONE CAR NUMBER TO BE PLACED IN EACH SECTION EXCEPT IN CASE OF CHANGE-OFF
16
IV

Individual Car Mileage for Each Run or Part Is Indicated in One of the Blocks of This Perforated Sheet

The mileage of any car from one given date to another is the difference between the amounts shown on these dates opposite the car number, except in case of a period which extends beyond the first of the year, in which case it is necessary to take the difference from the first date to Dec. 31 and add to it the amount shown on the last date.

The daily mileage records are filed on post binders and are handy for reference, so that information can be taken off from them with little difficulty.

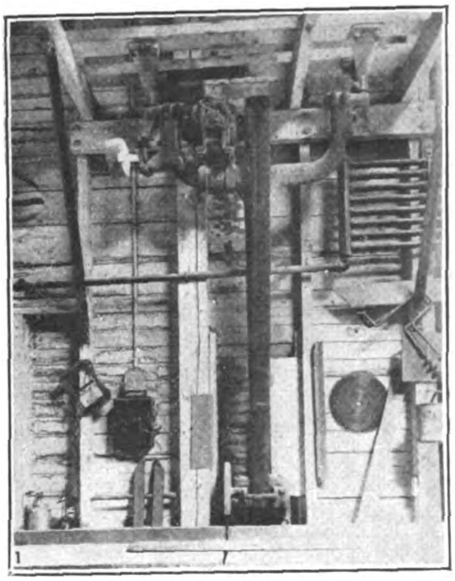
ONE POSTING MACHINE HANDLES ENTRIES FOR THE ENTIRE SYSTEM

During the month of July, with approximately 970 cars in operation, there were 43,555 entries of mileage, giving a total of 2,297,558.79 miles. Working a forty-four-hour week, 223 entries per hour had to be made. This was accomplished easily using only a single machine.

This system is useful to get the mileage record of any group of cars, and gives the mileage history of each individual car and piece of equipment that can be identified by a serial number, such as trucks, wheels, axles, gears, motors, armatures, pinions, compressors, etc. This mileage record is cumulative, giving a daily total for each car and group of cars. It simplifies the finding of the mileage operated from one given date to another.

Individual mileage records are kept for various parts of the equipment on 3x5-in. cards. Since the car mileage is kept by the posting machine, it is only necessary to record mileage of the parts when they are subject to change from the car. Mileage records are given for wheels, compressors, motors, armatures, axles, gears and pinions. In addition to the information shown on the faces of the cards, those for compressors, motors and armatures have spaces on the reverse sides for a record of repairs, columns being provided for report number, date, description and cost. These forms are reproduced on page 856.

Individual Motor Mounting Improves Shop Drives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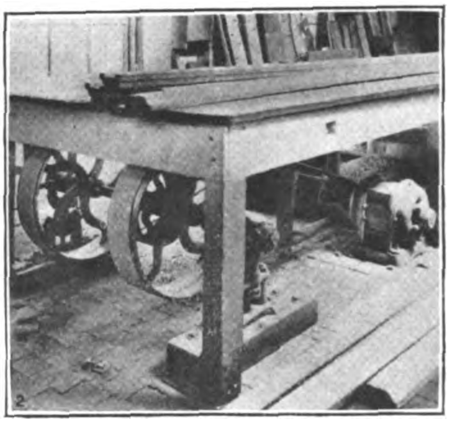
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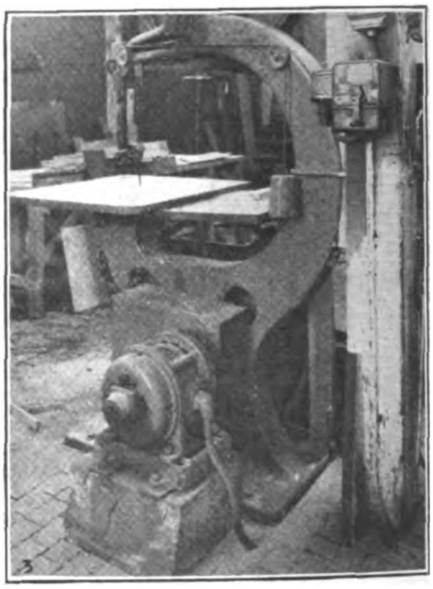
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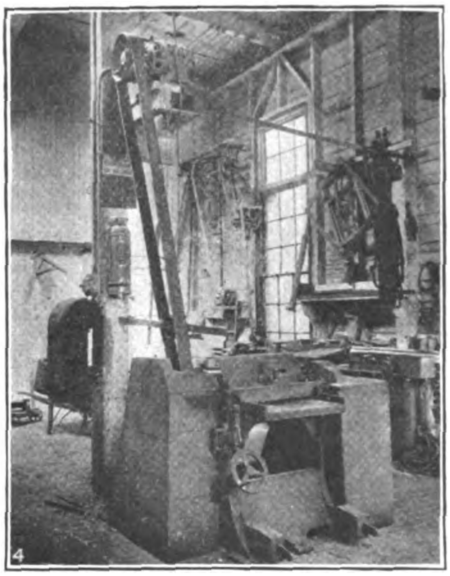
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THE illustrations on this and the following page show what can be done in the way of improving motor drives by adapting the mounting of individual units to existing tools, and also, in one or two cases, the convenience with which motors can sometimes be located directly upon or below the machines driven.

In some quarters the use of "home-made" motor mountings has been criticised as not representing the latest thought of the electric motor and machine tool maker. This however, would be a poor reason for failing to improve old-established drives at low relative cost in shops where it is an advantage to get rid of long lines of shafting, oily drips, excessive belt friction, and poor power factor due to running motors unloaded or lightly loaded for long periods.

The machine tool drives that are described in this article are installed in the Washington Avenue, Chelsea, shops of the Eastern Massachusetts Street Railway.

No. 1. The motor-driven circular saw at cutting-up bench has a 3-hp. induction motor mounted in a swinging yoke above the bench, with compact belt drive to the circular saw pulley. A counterweight drops the motor and saw out of the way when not in action, and a conveniently located starting switch on the wall at the operator's left provides easy control of the service. The arc through which the motor travels is so small as to cause no trouble from wiring distortion when the machine is run.

No. 2. Driving a cutting-up saw by a 5-hp. motor mounted on the shop floor below the working surface of the tool. In this case a speed reduction was required and easily obtained by belting the motor pulley to a short jackshaft under the table, with concealed drive by belt to the pulley on the saw shaft. The motor occupies no otherwise useful space, and because the space on and above the table is needed for working the material effectively, the starting switch was located on a post at the right of the table, not shown in the photograph, but within a step of the working position.

No. 3. Here is a bandsaw gear-driven by a 5-hp. motor mounted on a floor pedestal of concrete at the side of the saw frame, with intermediate gear box. The motor service is brought through the floor by means of rigid conduit, and the gearing is protected by a thin but effective metal housing. A starting box on the adjacent post provides quick and easy control. In this case the disadvantage of being obliged to mount the motor on the floor at the side of the tool is considerably lessened by the use of the very compact gear drive and by the location of the motor out of the line of travel of workmen.

No. 4. Pony planer drive by belting from 5-hp. motor mounted on bracket platform about 12 ft. above shop floor. Here the motor is entirely out of the way even in handling long pieces of board; the wiring is direct in rigid conduit with convenient starting and stopping switch with push-button stop attachment on the post at the rear of the machine. The location of the single belt drive at the side of the tool frees the space around the working table for handling stock, and a close-up view of the motor mounting, which is unusually thorough for an overhead job on the side of a post, is shown in the next illustration, No. 5.

No. 5. Close-up of motor mounting for driving pony planer from post. The motor, a 5-hp. machine running on 220-volt service, is bolted to two 2-in. x 9-in. timbers carried on 4-in. x 5-in. sills resting on a 2½-in. x 12-in. extension piece attached to the post by bolts as shown. The bolts are ⅝-in. diameter. Strap-iron pieces as shown reinforce the ends of the improvised platform, and right-angled bracing in the form of a tie-rod from above and a horizontal stiffener piece from the left are used.

No. 6. Lathe driven by 2-hp. motor mounted on wall-bracket directly over tool and with starting switch and fuses between motor and tool. Space was readily available here for belting the motor to an overhead shaft and pulleys from which a flexible down-drive to the lathe could be had. While many self-contained lathe-motor combinations are now available for shop service, the arrangement shown was put into use at moderate expense, takes up little room useful otherwise and provides an effective and economical drive.

No. 7. Simple and convenient drive of buzz planer by overhead 5-hp. motor. Directly behind is a self-contained motor-driven mortising machine, the 3-hp. unit required being mounted on top of the frame, and at the rear, left, is shown a vertical drill with overhead mounted motor. The absence of overhead line shafting and belting complications is a convenience in material handling. The planer motor is mounted simply on a 2¾-in. x 16-in. plank bolted to the post.

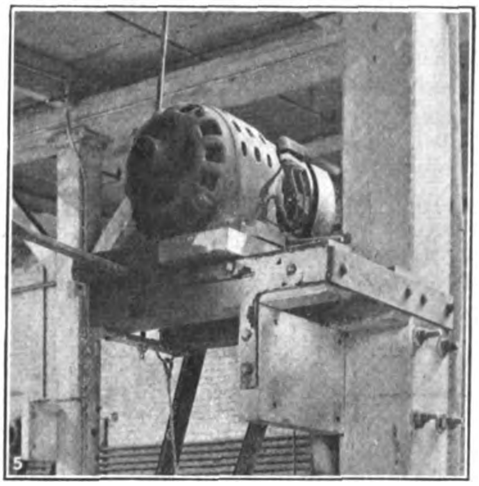
No. 8. An irregular molder individually driven by a 5-hp. motor located beneath the working table. Here the drive is extremely simple, with the motor bolted to the under side of the table and served by a short vertical run of rigid conduit brought up from the floor to the terminal cap on the motor frame. The drive is out of the way and yet the motor is readily accessible for inspection or repairs.

No. 9. Close-up of drill press and overhead mounted motor shown in No. 7. The motor, a 3-hp. direct-current unit, is carried on a platform supported on a ⅜-in. x 1½-in. strap bracket carrying 1¾-in. x 5-in. planks to which the motor base is attached. The belt driving is at the rear and thus out of the way of the workmen.

The drives shown herewith were worked out under the direction of W. C. Bolt, superintendent, and H. S. Wray, assistant superintendent of rolling stock and shops, Eastern Massachusetts Street Railway, Boston.

Since the Eastern Massachusetts Street Railway had available both alternating current and direct current at the Washington Avenue shop, it was possible to select the type of drive best suited for each machine tool. While in general the most convenient system of power supply is direct current, motor manufacturers recommend the use of alternating-current induction motors for constant-speed machines where possible, with direct current for machines that must run at variable speeds or have heavy starting conditions. The wide variety of machines illustrated in this article shows the adaptability of the motor drive to a number of different conditions such as exist in most electric railway shops. Where the electric installation is designed as a part of a new machine tool, speed changes may be provided by means of gears built as an integral part of the machine. This allows a constant-speed motor to be employed, but to obtain the speed increments necessary with a direct-current adjustable-speed motor requires abnormal gear combinations. Very often a single gear change is used with an adjustable-speed direct-current motor to obtain a wide speed range.

The comparative freedom of the Washington Avenue shops, as rearranged, from overhead shafting and belting is not shown in the illustrations. Where new machinery with individual motor drive is installed, it is, of course, possible to eliminate the shafting and belting. In this case, however, the shafting had been removed from the machines on which individual motor drive was installed, but long belts were necessary where the motors were placed overhead.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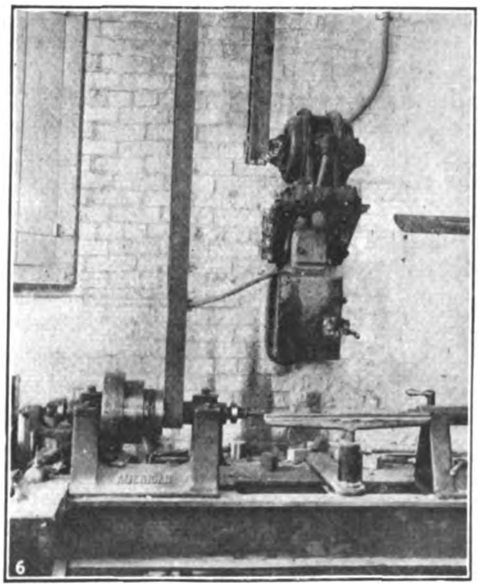
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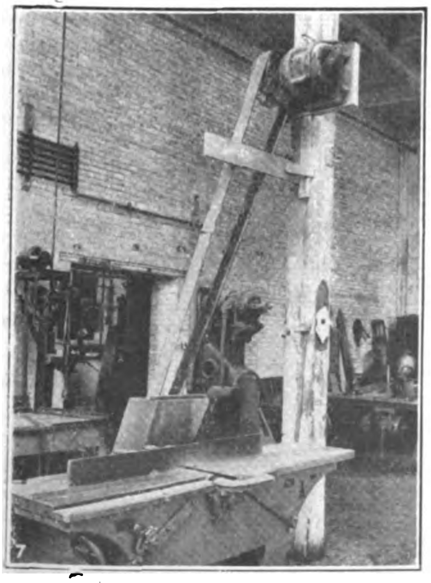
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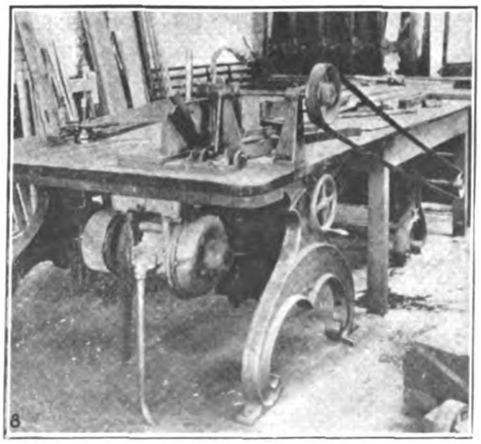
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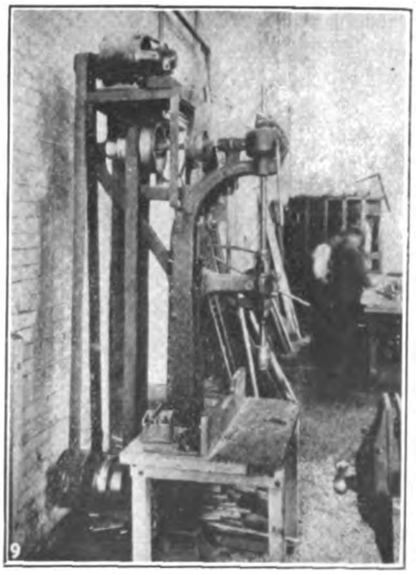
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Reconstructed Cars for Open Air Line

A DEMONSTRATION run with a train of four reconstructed Manhattan elevated cars was given on the Second Avenue line in New York on Nov. 7, as mentioned in the news colums of this paper in the issue of Nov. 10. The reconstructed cars have vestibuled platforms, with sliding doors in place of the old platform gates and railings. The sliding doors are of sheet steel construction with two panels, one with glass and the other closed. The doors slide on the outside of the car. This construction is of particular advantage as a pocket does not have to be provided inside, which would otherwise disturb the interior equipment. The motorman's operating cab is still retained in its original position just back of the platform.

The sliding doors are electro-pneumatically operated by door engines installed under the longitudinal seats at the ends of the car. The control of these door engines is by control switches installed on the ends of the car. The operator's station is on two elevated footrests between the two cars. By having a train line control cable, multiple operation of the doors is provided, so that one operator can control the doors on as many cars as found advisable. Cut-out switches for the door control lines are installed inside the cars, so that the control connections can be dead-ended at the operator's station or connected through to the next car as desired. Indicating signal lamps are installed at the center of each car on the outside. The circuit for these signal lights passes through both the door contacts and the door-locking contacts, so that it is necessary to have the doors both closed and locked before the lights are extinguished to indicate that the train is ready to start. The motorman's cab is also equipped with a starting signal, which lights when all doors are properly closed and locked. The locking of the doors is accomplished by a small projecting stirrup, which is pulled in when the doors are unlocked and is extended for the locking position.

Provision is made for the emergency opening of doors by a glass-inclosed mechanism at each end of the car. The glass is lettered "To Open Door in Emergency, Break Glass and Pull Weight." The pulling of the weight raises the operating arm of the door engine beyond its center so that the door can be readily pushed back. Similar emergency operating equipment is provided on the outside of the cars as well. These are intended for use of platform attendants and hooks for the emergency operation are kept at each station. The first test train had ventilators installed on the roof over the vestibule portions of the car. It has not been definitely decided whether all future cars will be so equipped or not. The cars remodeled have been thoroughly overhauled and painted and varnished on the outside with the new standard color goldenrod orange. The inside has also been renovated and painted. The lower woodwork is finished in mahogany and the ceilings in white enamel to improve the lighting conditions.

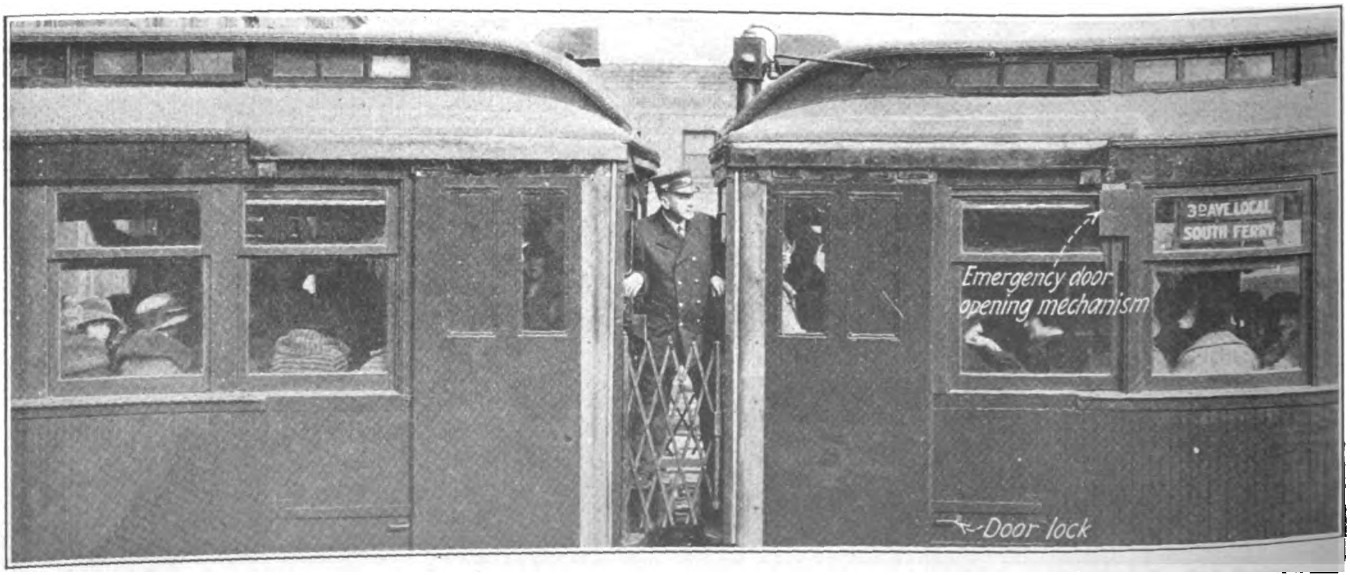
Sign Tells How Many Windows to Open

IN ORDER to insure uniformity in regard to the number of windows open in the cars, the New York Railways has installed a changeable sign in the inspector's shanty at the West Twenty-third Street and Eleventh Avenue carhouse. The sign is lettered in black on a white board in the shanty window on the Twenty-third Street side, where it can readily be seen by all passing cars. It reads, "Windows Each Side All Down," as shown in the accompanying illustration. The fourth word is not permanently lettered on the sign, but is on a second board behind the main sign and is read through an opening therein. The rear board rotates and the word appearing through the opening may be changed at will to read "one," "two," "three," etc.. or "all."

WINDOWS
EACH
ALL DOWN
SIDE

Sign in Window of Inspector's Shanty Gives Instructions as to Windows

The windows of the cars of the New York Railways are of the drop sash type, so that having the windows down means having them open. The device is somewhat similar to those whose object is to control the use of electric heat on the cars. Such arrangements have already been described in the ELECTRIC RAILWAY JOURNAL, but they are useful only during parts of the year, while the instruction board telling the conductor how many windows to open is useful throughout the entire twelve months.



Train of Remodeled Cars with Doors Closed Ready to Start

N. & W. Line Trouble Record Analyzed

Total Period of Interruptions to Traffic Chargeable to Electric Equipment and Transmission in 1922 Was About Sixty Hours—During Entire Month of March No Line Trouble Was Reported—Pantograph Proved to Be Most Liable to Injury of All Parts of Electric System

THE log of line troubles for 1922 compiled by the electric traction department of the Norfolk & Western Railway, reproduced herewith, shows that most of these are of a trifling nature, a relatively small number causing any interruption to traffic. The electric traction department requires that all defects be reported, hence the table contains many that may seem trifling, but these are included for completeness.

In compiling the records the total delay caused is included. If, for instance, an insulator flashover causes a power interruption of thirty minutes, the delay shown is equal to the number of locomotives delayed multiplied by thirty minutes. The delay, therefore, does not mean the length of time the line was out of service. For example, on June 4 a wooden pole gave way on one of the mine outlet tracks, causing the trolley wires to get out of line and wrecking a pantograph on locomotive No. 2,505. Power was off this section from 5:02 p.m. to 5:44 p.m., or forty-two minutes. As a result locomotives No. 2,507, No. 2,505 and No. 2,502 were each delayed forty minutes, and No. 2,500 was delayed twenty-five minutes. The delay shown is thus two hours and twenty-five minutes, due to this particular case of trouble.

The tabular summary of the causes of interruption to traffic shows that there were fifty-one of these, or slightly less than one per week. Of these fifty-one, eleven are chargeable to wrecks and bad track, for which the electric traction department is in no way responsible, so that the actual number is forty, or an average of three and one-third per month.

The total period of delays to movement, including those due to wrecks and bad track, is 161 hours and twenty-five minutes, and excluding these, 101 hours and twenty-five minutes. This is two and one-half hours for each of the forty delays, or an average of eight and one-half hours a month.

LINE TROUBLE ABSENT IN MARCH

It will be noted in the log that in one month, March, 1922, there were no line troubles reported, and further, as would be expected, that the interruptions are very light in the summer and relatively heavy in the winter.

For purpose of study, it is interesting to segregate the troubles into classes, in each of which there is a common element. Taking up first the transmission and contact line system, there were six short circuits on the line from unknown causes, none of which resulted in delays to traffic. Lightning was responsible for six trouble reports, accompanied by negligible delay. The

TABLE I—LOG OF LINE TROUBLE

Date	Place	Nature of Trouble	Delay Hrs.	Delay Min.
Jan. 5	Eckman	Insulator flashed in Eckman Yard......	3	17
Jan. 7	Bottom Creek	Loco. No. 2,503 wrecked pantograph. Ran onto non-electrified track........	..	30
Jan. 16	Maybuery	Loco. No. 2,506 wrecked pantograph. Broken spring on truck and track bad.	..	50
Jan. 16	Powhatan	Loco. No. 2,506 wrecked pantograph, due to broken driver spring..........	..	45
Jan. 17	Empire outlet	Loco. No. 2,502 wrecked pantograph, account of bad track...............	1	20
Jan. 17	Bluestone	Cab 24 turned over and broke off wood pole..............................	..	..
Jan. 18	Vivian	Trolley burned in two on crossover to old main line......................	1	25
Jan. 21	Morgan	Insulator flashed over on pantograph of Loco. No. 2,503..................	1	..
Jan. 22	Pocahontas	Bus line on Loco. No. 2,502 burned off at three-way connector and dropped on roof..............................	2	..
Jan. 23	Clift Yard	Loco. No. 2,508 wrecked pantograph, due to pin falling out of live insulator and allowing it to catch pantograph...	..	..
Feb. 6	Ruth Hill	Loco. No. 85, steam engine, flashed set of insulators and burned messenger in two..............................	6	45
Feb. 9	Keystone	Disconnect switch flashed to ground when opened.....................	..	..
Feb. 9	Bluefield Yard	Wood stick flashed on No. 7 track.......	..	15
Feb. 9	Bluefield Yard	Loco. No. 2,509 wrecked pantograph on Cab 22, coming in on west end of pit track..............................	..	25
Feb. 12	Bluestone	Loco. No. 2,502 wrecked pantograph in Bluestone Yard....................	..	10
Feb. 25	Bluestone	Loco. No. 2,508 wrecked pantograph on crossover east of power house........	..	..
Mar.	....	No line trouble reported for month of March............................	..	..
Apr. 1	Bluestone	Pantograph raised with ground on another pantograph................	..	..
Apr. 4	Coaldale	Main lead to transformer grounded in conduit on Loco. No. 2,505.........	..	30
Apr. 7	Cooper	Loco. No. 2,506 wrecked pantograph at Cooper crossover................	1	25
Apr. 20	Lick Branch	Loco. No. 85 wrecked and knocked down one signal bridge and one tubular bridge..............................	60	
Apr. 20	Bluefield Yard	Body span burned in two..........	1	15
Apr. 28	Bluefield Yard	Radford lead burned in two at Mercer Street..............................	..	30
May 2	Ruth	Piece of fishpole on top of cab caused ground............................	..	40
May 7	Switchback	Appalachian Power Company's 25-cycle circuit breaker blew up..............	1	..
May 9	Maybuery to Bluestone	Short circuit, cause unknown...........	..	..
May 12	Eckman	Set of insulators flashed due to lightning	..	40
May 13	Vivian	Loco. No. 2,507 had ground, due to piece of fishpole on top of engine......	2	44
May 16	Ennis	Loco. No. 2,504 wrecked pantograph, due to pantograph unlatching while running..............................	3	54
May 21	Kimball	Engine No. 9, popping off under set of insulators, caused insulators to flash....	..	..
May 24	Coaldale	Loco. No. 1,507 had ventilator up and struck wire in tunnel...............	..	..
May 29	Bluestone	Loco. No. 2,509, wrecked pantograph on crossover; board from bridge struck wire..............................	..	40
May 31	Delta	Loco. No. 2,503 wrecked pantograph, ran onto non-electrified track.........	..	..
June 1	Upland	Short caused by bird, burned steady-span in two..........................	..	..
June 1	Bluefield	Short circuit, cause unknown...........	..	..
June 1	Bluefield	Short circuit, cause unknown...........	..	..
June 2	Switchback	Loco. No. 2,500 wrecked pantograph in Switchback Hollow; operator did not give crew copy of embargo order......	3	..
June 2	Switchback	Loco. No. 2,500 pulled out on line but had pantograph grounded, causing another short........................	..	..
June 3	Ruth	Piece of fishpole on roof of Loco. No. 2,508 grounded.......................	..	20
June 4	Bluefield	Short circuit, cause unknown...........	..	..
June 5	Bluefield	Short circuit caused by bird at Grant Street bridge........................	..	..
June 8	Keystone	Loco. No. 2,510, oil circuit breaker blew up due to resistance grounding in breaker............................	..	..
June 13	Bluefield Pit	Short circuit, caused by opening yard switch with power on locomotive transformer.......................	...	..
June 14	Bluestone	Short circuit caused by raising of pantograph with one ground hook in.......	..	..
June 15	North Fork	Loco. No. 2,507 wrecked pantograph coming out of Byrd Yard. Bad track.	2	45
June 17	Eckman Yard	Loco. No. 2,507, breaker blew up.......	..	..
June 19	Switchback	Short circuit, caused by wreck in Switchback Hollow.........................	..	..

(Table continued on next page)

TABLE I—LOG OF LINE TROUBLE—(Continued)

Date	Place	Nature of Trouble	Delay Hrs.	Delay Min.
June 27	Eckman	Loco. No. 2,501 wrecked pantograph on east end No. 10 track. Bad track.....	3	30
June 27	Bluefield Yard	Insulator on No. 5 track, east of Grant Street flashed, due to activities of sparrow..........................	..	..
June 27	Houston	Dead end insulators flashed on Houston outlet, due to lightning................	..	..
June 30	Coaldale	High-tension cable on Loco. No. 2,508 grounded in conduit...............	1	..
July 2	Vivian	Loco. No. 2,507 wrecked No. 2 pantograph on crossover to old main line....	5	..
July 3	Maybuery	Feeder burned in two, probably due to lightning..........................	..	..
July 9	Bluestone	Switch closed on ground on pit.........	..	..
July 11	Bluefield	Short circuit, due to lightning...........	..	..
July 11	Vivian	Fire on top of high-tension oil breaker...	..	..
July 12	Bluefield Yard	Short circuit, cause unknown...........	..	..
July 24	Graham	Wood stick broke in two...............	..	..
July 26	Nemours	Loco. No. 2,508 reported lightning struck cab, flashing insulators........	1	55
July 28	Bluefield Yard	Yard crew ran Loco. No. 2,506 onto grounded line at freight house........	..	50
Aug. 8	Empire	Trolley burned in two at Empire outlet...	..	..
Aug. 13	Pulaski	Loco. No. 2,503 wrecked No. 1 pantograph, due to bad track.............	1	..
Aug. 18	Keystone	Fireman burned, putting up pantograph on Loco. No. 2,510; climbed on roof of cab................................	..	30
Aug. 21	Dans' Branch	Loco. No. 2,508 wrecked pantograph, due to wood pole splitting and allowing dead end to slack off............	..	45
Aug. 22	North Fork	Loco. No. 2,508 wrecked pantograph, cause unknown......................	..	20
Aug. 24	Flat Top	Set of insulators flashed...............	1	10
Aug. 24	Simmons	Tree fell across line; also three insulators flashed, due to lightning............	..	..
Aug. 28	Ruth	Loco. No. 2,510 knocked horn off pantograph............................	..	..
Aug. 30	Flat Top	Loco. No. 2,501 bus line burned in two....	..	..
Sept. 1	Ennis	Loco. No. 2,509 wrecked No. 1 pantograph at Ennis crossover............	..	..
Sept. 7	Bluefield Pit	Motor run onto grounded line	..	..
Sept. 12	Bluefield Yard	Loco. No. 2,502 wrecked pantograph, No. 10 track, west yard, ran engine onto non-electrified track............	..	45
Sept. 12	Eckman Yard	Loco. No. 2,509 wrecked No. 1 pantograph on No. 6 track; pantograph out of line............................	2	15
Sept. 13	Vivian	Loco. No. 2,503 wrecked No. 1 pantograph on No. 5 track in Vivian Yard. Bolt came out of clip...............	1	25
Sept. 15	Bluestone	Loco. No. 2,501 ran onto non-electrified track..............................	..	..
Sept. 16	Bluefield Pit	Switch opened on pit track with locomotive spanning breaker............	..	..
Sept. 27	Bluefield Yard	Loco. No. 2,510 wrecked pantograph on crossover at passenger station........	..	..
Oct. 2	Eckman	Loco. No. 2,509 wrecked pantograph on No. 6 track..........................	..	..
Oct. 6	Bluefield Pit	Switch opened while motor was running.	..	..
Oct. 7	Powhatan	Set of insulators flashed over at Powhatan Coke track	..	..
Oct. 12	Bluestone	Loco. No. 2,505 burned wire in two on Pocahontas Branch while standing at tower.............................	..	..
Oct. 12	Bluefield	Solder melted out of terminal on disconnect switch lead and allowed lead to drop..............................	2	50
Oct. 16	Peerless	Set of dead-end insulators flashed......	..	..
Oct. 22	Eckman	Loco. No. 2,500 wrecked pantograph No. 2 on east cab coming out of Eckman Yard, due to bad track......	..	50
Oct. 23	Bluefield	Loco. No. 2,507 wrecked pantograph at Mercer Street Bridge...............	..	..
Oct. 23	Bluefield	Loco. No. 2,500 wrecked pantograph on crossover at west end of No. 11 track in Bluefield Yard. Had knocked horn off at Eckman.....................	..	..
Oct. 28	Bluestone	Helper shocked in Bluestone Yard......	..	..
Oct. 29	Elkhorn	Loco. No. 2,502 wrecked pantograph on Elkhorn Siding	1	30
Nov. 1	Pin Hook	Loco. No. 2,502 flashed insulator on pantograph	..	55
Nov. 9	Coaldale	Loco. No. 2,506 wrecked pantograph at Coaldale crossover. Blew up Maybuery substation when breaker was closed on short circuit...............	20	..
Nov. 24	Eckman	44,000-volt line burned in two at Eckman, smoke from steam engine.....	3	30
Nov. 25	Eckman	Wood stick flashed on crossover, west end of Eckman Yard..............	..	..
Nov. 26	Eckman	Loco. No. 2,504 wrecked No. 1 pantograph east end of No. 10 track. Bad track..........................	1	30
Nov. 28	Bluefield Pit	Trolley burned in two on storage track. Improper handling of pantograph.....	..	40
Dec. 1	Eckman	Loco. No. 2,504 wrecked pantograph on No. 10 track, east end of Eckman Yard	2	35
Dec. 2	Eckman	Loco. No. 2,504 wrecked pantograph on No. 10 track. Bad track and pantograph out of line...............	1	10
Dec. 12	Eckman	Loco. No. 2,508 wrecked pantograph on No. 10 track. Bad track	2	..
Dec. 19	Bluefield Yard	Set of insulators flashed on lead. Engine No. 2,036 standing under insulators popped off..........................	..	20
Dec. 20	Eckman	Steady span burned in two...........	3	45
Dec. 26	Clift Yard	Cat climbed wood pole and bridged set of insulators.......................	..	..
Dec. 26	Bluestone	Insulator flashed on pantograph on Loco. No. 2,502. About 4 ft. of messenger wire found on cab.................	..	..

storm of Aug. 24 was a severe one, causing a tree to fall across the line, as well as three insulators to flash, but with no delay to traffic. The worst that the lightning did was usually to flash insulators, although in one case the burn-off of a feeder may be attributed to this cause.

In the electric zone it was not possible to use the ordinary rope "ticklers" which are customary on steam railroads to indicate to trainmen on the roofs of the cars that a tunnel or a low bridge is being approached. Instead, a reed fishpole hinged to the catenary side column is substituted. This extends over the track in such a position that the pantograph of an approaching train strikes it and causes it to swing parallel to the track. Occasionally in striking the pole the pantograph breaks off a piece of it, which drops down on the roof and grounds the pantograph. This is particularly true during heavy rainstorms. A total delay of three and three-quarter hours was attributed to this cause.

The smoke and steam from steam engines caused difficulty on four occasions, a negligible number in view of the fact that all passenger and freight trains go through the electric zone behind steam engines. Two engines popped off under insulators, one short circuited the 44,000-volt line by means of smoke, and another flashed over an insulator and burned out a messenger. These four accidents account for more than a sixth of the total year's delay.

Aside from the insulator troubles mentioned, the line insulators gave a good account of themselves. Occasionally there was a flashover, usually with a trifling delay or none, although an insulator flash early in January did cause a three-and-one-quarter-hour delay. The regular inspection and renewal of insulators described in the article in the issue of this paper for Aug. 11, 1923, page 203, insures a minimum of insulator troubles in service.

Something over one-sixth of the total time of delay tabulated may be charged to the burning off of contact and span wires and difficulties with switches and circuit breakers. The total for the year, however, is only ten, mostly minor troubles.

Locomotive troubles, aside from the pantograph wrecks already referred to, were of minor importance, having caused less than five hours' delay during the year. These include pantograph insulator flashovers, circuit breaker failures and wiring burnouts. The number coming within this class is ten, or less than one a month.

THE PANTOGRAPH IS THE MOST SENSITIVE PART OF THE EQUIPMENT

The pantograph is naturally the part of the locomotive which comes in for the most severe punishment. In construction it must be light and flexible to function properly. It is liable to injury from causes which have nothing to do with the electric equipment. For example, during 1922 nine pantograph wrecks were due to the track being out of alignment, another was caused by the splitting of a wood pole, another by the breaking of a driver spring, and still another by a pin falling out of an insulator. In another case a board from a bridge struck the contact wire and wrecked the pantograph. A large proportion of the pantograph wrecks

TABLE II—SUMMARY OF LINE TROUBLES CAUSING TRAFFIC DELAY

Number of Cases	Nature of Trouble	Delay to Movement Hrs.	Delay to Movement Min.
2	Insulators flashed on pantograph	1	55
2	Steam engine popped off under insulators	7	5
6	Wrecked pantograph, cause not determined	9	10
1	Wood stick flashed	..	15
2	Wrecks	63	0
1	Body span burned in two	1	15
3	Defective insulators	5	7
4	Ran onto non-electrified track	3	35
6	Defect on electric locomotives	6	30
9	Bad track	16	20
2	Trolley burned in two	1	55
1	Steady span burned in two	3	45
4	Foreign material on locomotive roof	4	20
7	Miscellaneous	13	9
1	Lightning	1	55

occur at crossovers, where the overhead line has to be more complicated than on tangent track.

In a few cases pantographs are wrecked due to their own defects, not more than three, however, during 1922. Occasionally one is injured through an unknown cause. On the whole, the pantograph is the cause of more delays than all other pieces of apparatus together.

In spite of watchfulness on the part of employees of the electrified section, men will occasionally forget or misunderstand instructions, causing unnecessary delay or inconvenience. There were from fifteen to twenty cases last year which can be thus classified, but among them all they caused but a little more than three hours delay. Such accidents as raising a pantograph with the ground on another pantograph, raising a pantograph with a ground hook on it, opening switches with power on, running onto non-electrified track or grounded line, etc., illustrate this class of trouble.

The log includes the result of a train wreck which caused a total delay of sixty hours. One signal bridge and one tubular bridge were knocked down and a short circuit was caused by the wreck.

The Readers' Forum

Additional Information on Steel Wheel Mileage

WASHINGTON RAILWAY & ELECTRIC COMPANY
WASHINGTON, D. C., Nov. 5, 1923.

To the Editors:

In the article appearing in the Aug. 18 issue of ELECTRIC RAILWAY JOURNAL under the heading "Wheel. Gear and Axle Practice" (on page 250) is shown certain data in the nature of mileages obtained on our property from different types of wheels for the year 1920. Since you obtained the figures as shown we have prepared similar statistics for the years 1921, 1922 and the first six months of 1923 which I think are more representative.

The Davis wheels that were scrapped during the year 1920 because of being unfit for further service were mostly put in service during 1918. Because of the stress of war conditions at that time, the factory did not turn out the high quality product that it is now doing. This directly affected the mileage obtained from the wheels of the Davis type that were installed during that year.

The mileage shown as obtained from 31-in. rolled steel wheels during 1920, while correct, is also misleading because we did not commence the extensive use of rolled steel wheels until the spring of that year. We did have a few rolled steel wheels that were put into service in 1918 for experimental purposes, and during 1920 four of these first wheels were scrapped because of being worn out. The average mileage for the four wheels was 90,000, but the mileage obtained from such wheels does not conclusively prove that similar results will be obtained from such wheels when used extensively. In the table below are shown the mileages of wheels on our property for the years 1920, 1921, 1922 and six months of 1923.

You will note from this that the Davis wheels have steadily increased in mileage and decreased in cost per 1,000 miles each year. In order to get the mileage shown for the rolled steel wheels it was necesary to remove them from service twice for turning, while in the case of the Davis wheels they were not removed after first installed until ready to scrap. This is decidedly in their favor.

We obtain the mileage of wheels scrapped by keeping an individual card record for every wheel on our system from the time it is put into service new until it is removed and scrapped. The number of wheels by types and sizes that were removed and scrapped during each month is also compiled, which shows the total mileage actually made by the scrapped wheels. This divided by the number scrapped gives the figures used for average mileage.

The reason we obtained better mileage from 30-in. Davis wheels than from 33-in. Davis wheels is because the latter are used entirely under 54,000-lb. cars operating at fairly high speeds and with frequent stops and severe braking conditions. The 30-in. wheels are used under cars weighing around 35,000 to 40,000 lb. in strictly city service. A large amount of our track is grooved rail with a very narrow groove which has only ⅛-in. clearance over wheel flange. Consequently the rolled steel wheel flanges wear very fast on the back side of the flange, which necessitates frequent turning, resulting in low total mileage when worn out. The Davis wheel having a very hard flange does not wear anywhere near as fast as the steel wheel.

R. D. VOSHALL,
Superintendent of Equipment and Buildings.

WHEEL MILEAGES FOR THE YEARS 1920, 1921, 1922 AND FIRST SIX MONTHS OF 1923
WASHINGTON RAILWAY & ELECTRIC COMPANY

Type of Wheel	Year 1920		Year 1921		Year 1922		First Six Months, 1923	
	Average Miles	Cost per 1,000 Miles	Average Miles	Cost per 1,000 Miles	Average Miles	Cost per 1,000 Miles	Average Miles	Cost per 1,000 Miles
20-in. cast iron	44,665	0.15	47,051	0.11	41,974	0.14	43,222	0.13
22-in. cast iron	41,841	0.206	39,552	0.18	38,221	0.22	37,705	0.19
30-in. cast iron	41,009	0.276	36,700	0.27	35,300	0.32	37,069	0.24
33-in. cast iron	41,577	0.304	51,993	0.17	39,005	0.25	20,982	0.58
30-in. Davis	48,725	0.688	66,559	0.41	91,278	0.30	102,244	0.27
33-in. Davis	65,254	0.559	71,651	0.46	79,076	0.41	90,997	0.38
31-in. rolled steel	90,000	0.383	52,180	0.66	84,702	0.41	81,271	0.44

Maintenance of Equipment

Selection of Waste for Motor Bearings

By Henry S. Day*
Railway Department, Westinghouse Electric & Manufacturing Company

Without good wool waste bearings of motors and truck journals cannot be properly lubricated, and the ratio between good and bad lubrication and good and bad waste is about the same. Probably there is no one article in the storeroom of the electric railway that varies so in quality and grade as the waste used for packing bearings.

The amount expended for lubrication which covers oil, grease and waste packing is only a very small percentage of the total cost of equipment maintenance, but poor lubrication causes a very large percentage of the troubles. Frequently a railway that has low lubrication costs has high costs for repairs. Many factors enter into poor lubrication besides poor waste, and there are many opinions as to what constitutes good packing. Years of operation have demonstrated that to feed oil properly and to prevent sagging the packing should be composed of pure wool yarn with few short strands. Strands should not be less than 12 in. or 15 in. long, should also be of a good diameter and well mixed. Such wool yarn will feed oil and at the same time retain a resiliency sufficient to hold it in place against the journal without sagging or matting.

Many specially prepared types of packing waste are composed of various grades of wool yarn mixed with cotton strands and different kinds of fibrous substances. Some of these prepared packings give fairly good results. If the packing is of an inferior grade and has a high percentage of cotton and fiber, it cannot lift sufficient oil to carry away dirt, dust and foreign substances that all tend to shorten the life of the bearing and wear the journal.

An additional cause of lean feeding in a mixed packing is the tendency for cotton and fibrous substances to bunch up and mat from vibration and thus introduce barriers which break the path of oil in its upward flow and reduce the amount that reaches the journal. Mats or pads formed this way also catch and hold sand and dirt which cannot fall to the bottom of the housing or journal box. Cotton and fibers when they come in contact with a moving journal will also form a glazed surface which will frequently cut off the oil flow. Another advantage of high-grade wool packing is that it can be washed and reclaimed and so be used over again.

Bearing and journal wear is costly and the source of much trouble. Good packing, oil and grease are a comparatively small item in the operating cost, and a liberal use of the best that can be procured will prevent much expense and many failures.

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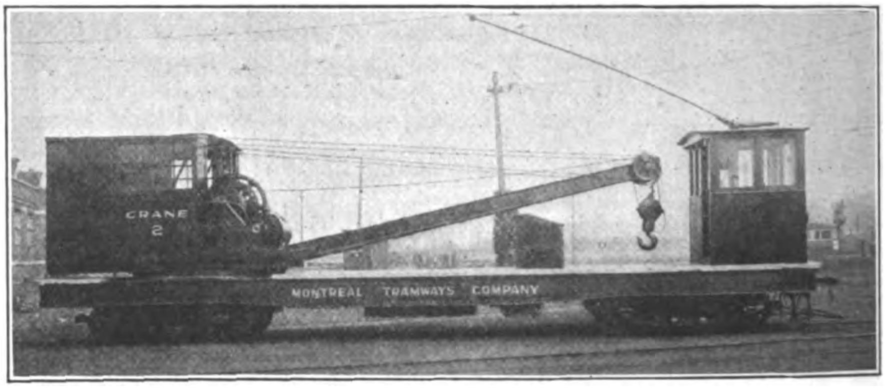
*Formerly superintendent of equipment Kansas City Railways.

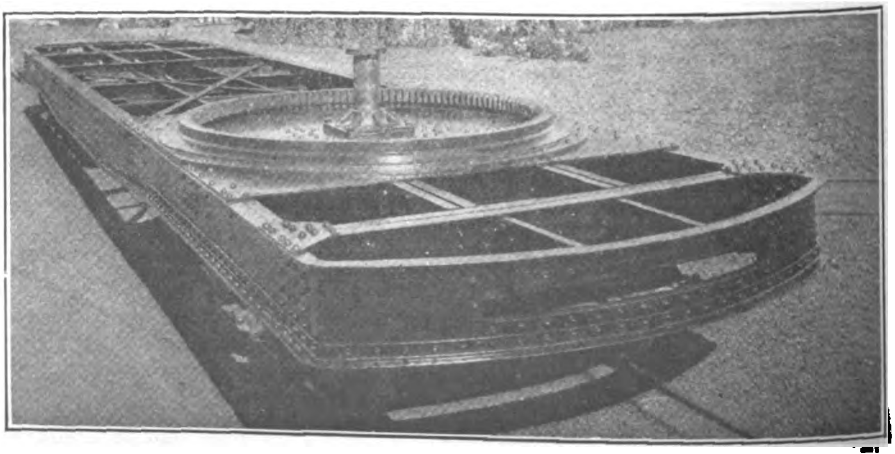


Montreal's Crane Car Ready for Service

Well Constructed Crane Car for Montreal

The Montreal Tramways has recently added a new crane car to the present work car equipment. The underframe was designed and built in the shops at Youville. It has an over-all length of 42 ft., width 8 ft. 5 in. and 41 in. body height, with an over-all height over top of rotating crane cabin of 11 ft. 5 in. The low body height was necessary to give the required subway clearances.

The body is of very rigid construction, consisting of two fish belly girders of ⅜-in. plate and 2½-in. x 2½-in. x ⅜-in. angles, connected by intermediate girders of ⅜-in. plate and 2½-in. x 2½-in. x ⅜-in. angles and heavy channel box bolsters. The rear end is covered by the half-inch plate to which the base ring is fastened, this forming the bolster top plate, also tying the whole structure together and preventing any twisting of the body due to swaying loads



Underframing of New Crane Car

when the crane is revolved. The body and trucks are equipped with interlocking side bearings which transmit the load directly to the truck side frame, thus relieving the bolster of the lifted load.

The trucks, which were built in the company's shops, are placed at 27-ft. centers. They are of 6-ft. 3-in. wheelbase with 30-in. wheels and special axles. The front end is fitted with a 5 x 6-ft. cab for the motorman.

A K-35 controller handles the driving equipment of four Westinghouse 533 motors connected in series, series multiple, to allow for slow movement with a lifted load. The weight of the car equipped is 77,600 lb.

The crane proper, which was purchased from the Ohio Locomotive Crane Company, weighs 37,100 lb. and is driven by a Westinghouse 37-hp. type K motor. It has a lifting power of 17,000 lb. at 12-ft. radius, 12,000 lb. at 15-ft. radius and 8,500 lb. at 20-ft. radius, these limits being fixed by the stability of the whole structure on the limited base of the 4-ft. 8½-in. rail gage. Much greater loads can be handled over the rear end of the car and, when suitable, struts are inserted between underside of car frame and the ground to give a wider effective base.

Maintenance of Bearings and Welding Practice

By O. A. Norene

Assistant Master Mechanic Omaha & Council Bluffs Street Railway

BOTH cast and malleable iron axle collars are being replaced with cast steel collars in Omaha. We are also discarding the cotter keys in all the collars and replacing them with plain locknuts which lock the screws rigid to the collar and prevent the threads from wearing on both screw and collar.

We are using cast steel axle shells, babbitt lined, on all our motors where a thickness of shell is ½ in. or over. The shells are machined in a specially designed jig in which they are held rigid without distorting them in any way. Two sets of jigs are used for each type of bearing, to permit the operator to change one pair of shells while the other set is being machined. The babbitting is done in a special mold where the bearings are cast finished complete with oil grooves. All halves are interchangeable. It has not been found necessary to tin these shells, as anchors cast in the flanges and body of the shell are ample to hold the babbitt.

REPAIRS BY WELDING

For repair of broken truck frames, cast steel bolsters, motor cases or for any heavy welding we are using the thermit process. Armature shafts are welded in this manner if broken at the pinion end and if the winding is found to be in good condition. The weld is always made from 2 in. to 3 in. from the end of the pinion taper. This is done principally to get as large an area for weld as possible.

Worn pinion fits and broken and worn keyways in armature shafts are built up with oxyacetylene torches and the shafts machined to standard sizes. We have discontinued entirely the use of so-called liners of sheet iron, canvas or paper, and by so doing we have also elimi-

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The Roadmaster Catches H—

And he takes it because he knows he's been asleep. General manager of Jinxville Railway says roadmaster's slackness was responsible for justified complaint of riders as voiced in newspaper editorial. Insists that fault be acknowledged and conditions rectified and makes deep impression

* * *

"MR. REDFIELD, did you see the editorial in this morning's Jinxville *Clarion*, complaining about our track on Main Street?" asked Charlie Riter, Mr. Redfield's clerk, on the boss' arrival at the office.

"Yes, Charlie, I did, thanks, but I'm pleased to note that you take enough interest in the property to call my attention to it. That track ought to have been fixed up long ago. I'll see Tom Fairweather about it today. He's roadmaster and it's his job to forestall such complaints. Here's the superintendent; we'll see what he has to say.

"Good morning, Bill, I see the *Clarion's* after us about our Main Street track."

"No wonder, Mr. Redfield, that track's a disgrace. The joints are the main trouble and they are awful. John O'Neill and I learned something about track at the Atlantic City convention that we ought to apply here. I wish you'd have Tom put in some of the welded joints that we've heard so much about."

"I'll see him today, Bill. Something's got to be done. We must make a start anyway before next Sunday. Charlie, get hold of Mr. Fairweather as soon as you can and tell him to come to my office."

On Fairweather's arrival the G. M. lost no time in coming to the point.

"Good morning, Tom. This morning's paper says our Main Street track might be improved. What about it?"

"Sure, Mr. Redfield, it's the worst piece of track in town, but I don't think they ought to roast us about it that way. I intended to patch it up next spring."

"Look here, Tom, don't you realize that if the public has good reason for a complaint like this it makes it mighty hard to maintain good terms with our car riders?"

"Oh, it's just one of them young reporters who wanted something to complain . . . ."

"Stop right there, Tom. You're all wrong. Gainway says there's good reason for the complaint and, as superintendent, he ought to know. Trouble with you is you're not keeping up to the times. What kind of track joints have we on Main Street?"

"Fish-plates; same as we've always used. I never took much stock in these newfangled joints."

"Well, you've got to take stock in them from now on, Tom. You had better get yourself posted right away on these welded joints and jointboosters and one thing and another that Bill and John say stirred up so much interest at the convention. I want to put an ad in the *Clarion* telling the people of Jinxville that improvements are going to be made. If we've been slack, let's say so, but saying at the same time that we're going to fix up the track right away. We'll tell them, too, that we have done a lot of other things to improve service on this property in the last year.

"Now don't fall down on this job, Tom, even if you have been working here for thirty years. You can keep up to date if you'll read the JOURNAL and think and keep up with what other people are doing. You know I don't want to get a new roadmaster unless I have to. Let me know tomorrow what we ought to do on Main Street and how soon we can get it done, so I can write my advertisement."

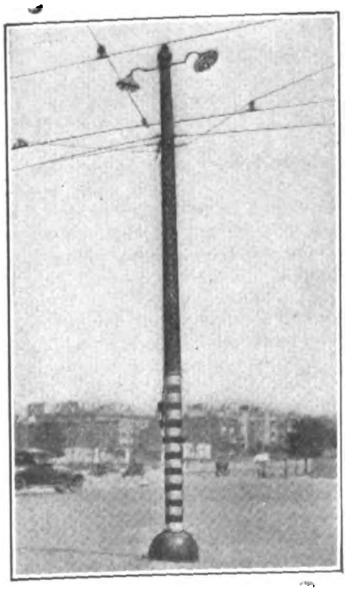
"I guess maybe you're right, Chief, I have been a little slack. I'll get right after this."

nated almost all the loose pinion trouble we used to have. No attempt is made to build up the worn bearing surface on an armature shaft by welding. When worn down too small, a seamless steel tubing is shrunk on to bring the shaft to standard size.

Reducing Exposed Pole Hazard

THE trolley pole shown in the accompanying illustration is located in the plaza at the entrance to Prospect Park, Brooklyn. It had to be set well out toward the center of the plaza in order to support the overhead work at the intersection of two streets, on both of which there were electric railway lines. In this location it was in constant danger of being struck by passing vehicles. In order to make the pole conspicuous at night as well as during the day, a cluster of ten lights was installed at the top of the pole. Then to make it stand out even in the daylight it was painted, in accordance with a city ordinance, with alternate white and black stripes for a distance of approximately 12 ft. above the ground line.

It was further protected by a cast-iron wheelguard at the base of the pole. This wheelguard will deflect wheels of passing vehicles to one side and greatly lessen the blow as well as cause the wheel to be struck rather than the body of the vehicle, so that if the automobile or wagon were damaged it would be in a part that would not also cause injury to any persons who might be riding in the vehicle.



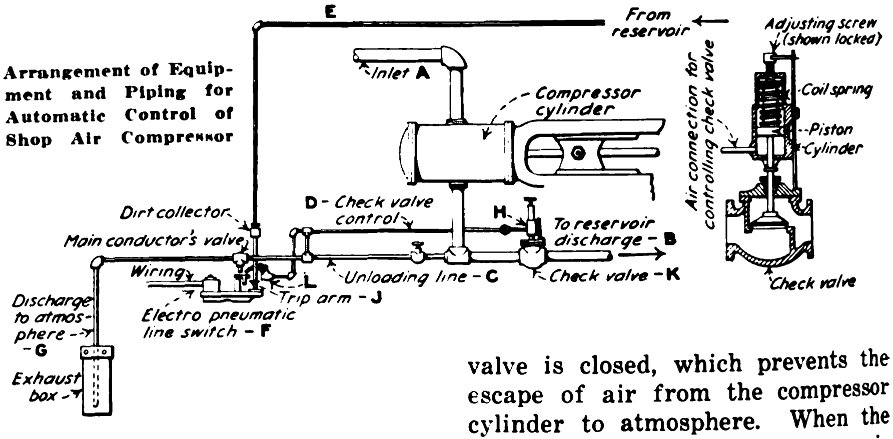
A Thrice-Protected Pole

Automatic Control for Shop Compressor

By H. Cowen
General Foreman New York Railways, New York, N. Y.

AT THE Fiftieth Street shops of the New York Railways compressed air for hoists and pneumatic tools was supplied by a "Platt" straight-line, single-stage, double-acting compressor, driven by duplex belts from an overhead countershaft belted to a 75-hp. motor. This compressor had been in operation over twenty years and increased demands for air imposed excessive duties on it and necessitated the use of larger supply reservoirs. The only ones available were ample in size for maximum requirements, but excessively large for the normal shop needs. This resulted in the compressor running idle for a major portion of the days and caused overheating.

Frequent shutdowns were necessary for repairs, such as renewing main and crankpin bearings, crosshead gibs, inlet and discharge valves and seats. The two latter resulted from deposits of carbonized oil, caused by excessive temperatures. These troubles were not anticipated, as an unloading device formerly part of the compressor and connected in the inlet pipe was expected to control the compressor operation during rush and normal periods. Its function, however, was merely to restrict the inlet flow of air and it did not eliminate idling, with its attendant waste of power and rapid wear of parts. Automatic control was therefore added by the use of several spare air-brake parts. A shop-made automatic controller was used for stopping and starting the compressor motor, at a minimum reservoir pressure of 40 lb. and maximum pressure of 65 lb. These, together with the spare air-brake parts, such as the General Electric type MC Westinghouse 275 line switch, conductor's valves, fender trip cylinder and a standard 5-in. check valve were piped, as shown in the accompanying diagram.



Arrangement of Equipment and Piping for Automatic Control of Shop Air Compressor

Referring to the diagram, *A* is the inlet to the compressor, *B* the discharge to the reservoir, *C* an unloading connection, *D* a check valve control line, *E* the connection from the reservoir to an electropneumatic line switch, *F* the line switch and *G* the discharge to atmosphere. During compressor operation, the line switch *F* is de-energized and the conductor's valve is closed, which prevents the escape of air from the compressor cylinder to atmosphere. When the air pressure in the supply reservoir reaches the required maximum of 65 lb. the G.E. governor, previously adjusted, opens the main motor circuit and the compressor comes to rest.

As air is consumed the reservoir pressure diminishes to 40 lb., when the governor cuts in and closes the motor circuit, simultaneously energizing the magnet valve in *F* so that communication is established between the reservoir and the conductor's valve trip cylinder. This moves the trip arm *J* upward and opens the conductor's valve so that a rapid release of the air confined in the compressor cylinders occurs, which removes the resistance against starting. Without this arrangement, proper acceleration of the compressor was impossible because both the motor and countershaft belts slipped and in many instances these were damaged.

After the motor circuit is closed, the automatic contactors on the switchboard gradually cut in resistance as the acceleration progresses. When the magnet valve in *F* is de-energized, the trip arm *J* drops and closes the conductor's valve and the atmospheric discharge line from the compressor cylinder. Air now passes through the main discharge and check valve into the main supply reservoir.

The check valve *K* functions only during the acceleration period, when air passes from the unloading pipe to the cylinder *H*, which contains a piston and rod integral with the check valve stem. By adjusting the screw pressure on a coil spring as shown in the enlarged section of the check valve the air pressure, for completed acceleration, is regulated. When the piston moves up the check valve is held open, allowing air to flow from the compressor to the supply reservoir. This eliminates pounding of the check valve on its seat.

To prevent a general discharge of air from the supply reservoir through the unloading and atmospheric lines, at the instant of starting, a conductor's valve *L* with a multiplying lever is connected to the check valve control line, so that the air in the check valve cylinder discharges to atmosphere and allows the valve to seat before the main conductor's valve opens.

A series of tests made after installing this apparatus showed that during 50 per cent of the working day the compressor was not required to operate. The reduction in power consumption and the elimination of shutdowns have produced a substantial saving. Furthermore, renewals of main valves, seats, bearings, etc., have not been necessary during the past two years, and an improved shop output has resulted from the successful operation of the compressor.

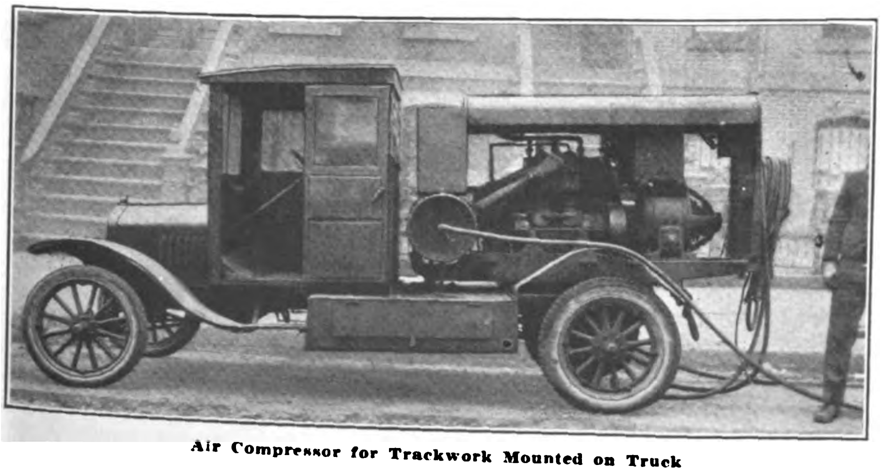
New Equipment Available

Truck-Mounted, Electrically Driven Compressor

TO MEET the demands of electric railway track departments for an electrically driven air compressor, which can be readily and conveniently moved about, the Ingersoll-Rand Company, New York, N. Y., is placing on the market a new type 20 equipment shown in the accompanying illustration. A standard Ingersoll-Rand duplex air compressor, with 5-in. x 5-in. cylinders and having a capacity of 91 cu.ft. piston displacement per minute, is direct-connected to the compound-wound direct-current motor used for driving.

The motor obtains its current from the overhead trolley and is designed to operate at practically constant speed within a range of 400-600 volts on the trolley. This takes care of the voltage variation commonly experienced in electric railway service and maintains the capacity of the outfit under practically all conditions. This outfit has sufficient capacity so that it will operate four tie tampers or two paving breakers.

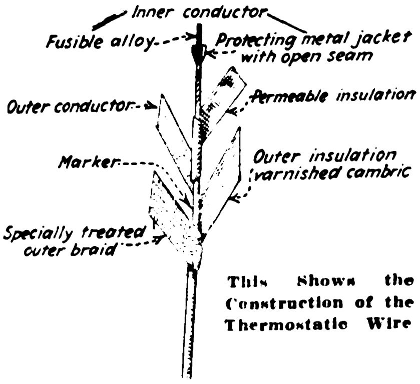
The use of an electric drive which can be operated directly from the overhead trolley supply is a particularly attractive feature to electric railway track men, and the constant speed feature is of advantage. The type 20 equipment is offered either ready for mounting on any standard Ford truck or complete with truck as specified. Some companies have found it convenient to make use of old motor trucks with this unit, as the amount of actual travel in miles which such a unit is required to make is comparatively small.



Air Compressor for Trackwork Mounted on Truck

Continuous Thermostatic Wire for Fire Alarm Systems

AN AUTOMATIC fire alarm system applicable to railway carhouses, substations, etc., is marketed by the Fire Detecting Wire Corporation, New York, and is said to possess several advantages over other systems now widely used. It consists of various circuits of continuous thermostatic wire, each connected with a centrally located control panel and with alarm gongs. In the event of fire, or even of undue heat, an alarm will be given before the fire has become dangerous. This thermostatic wire consists of a core of special fusible alloy covered with a protecting metal jacket having a narrow open seam. Superimposed upon this is a permeable wrapping of cotton yarn which provides insulation between the core and an outer conductor of spirally wound brass tape. On top of this is a layer of varnished cambric to protect the wire against grounding and a varnished cotton braid outer covering to give mechanical protection.


Inner conductor
Fusible alloy
Protecting metal jacket with open seam
Permeable insulation
Outer conductor
Marker
Outer insulation varnished cambric
Specially treated outer braid

This Shows the Construction of the Thermostatic Wire

The soft metal in the interior of the wire has a fusing temperature of 160 deg. F. The wrapping material outside, however, has a retarding effect equivalent to about 20 deg., so that the actual fusing temperature of the wire is about 180 deg. under normal conditions. Under a very slow heat the fusing point is reduced to approximately 160 deg., because the whole mass has time to become thoroughly heated.

When the metal core fuses, it spurts through the seam in the protecting cover and through the permeable insulation, making electrical contact with the outer conductor of brass tape. This shunts out a resistance, and the alarm box, indicator, etc., give their warning.

Although the fusing point of the

metallic alloy is theoretically about the same as that for sprinkler heads, nevertheless experience has demonstrated that the alarm will always be sounded some time before the sprinkler system operates. The reason for this is that the metal pipes of the sprinkler system and the water contained therein tend to carry away the heat from the sprinkler head and thereby postpone its melting.

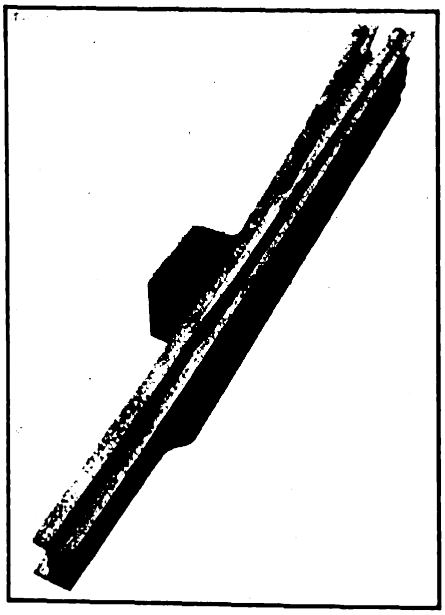
A supervisory current passes continuously through all parts of the system, including the core and brass wrapping of the wire. Any interference with this supervising current, such as that caused by an open circuit, results in a trouble signal. False alarms have been eliminated.

Wires are spaced about 10 ft. apart or approximately the same distance as sprinkler pipes. A single circuit may contain from 1,000 to 1,500 ft. of thermostatic wire. With the 10-ft. spacing 1,000 ft. of wire will protect 10,000 sq.ft. of floor area. When desirable smaller sections may be used, giving a finer allocation of alarm.

An interesting possibility in the thermostatic wire is its use in automatic substations. Stations may be wired not only for fire but for protection against overheating of transformers and other apparatus. The installation of the thermostatic wire makes it possible to sound an alarm and automatically shut the station down in case of fire or the overheating of any of the equipment, which is particularly desirable for older type manually operated stations.

New Switch Provides Unbroken Main Line Rail

A TYPE of switch which embodies several new features is being marketed by the Railway Safety Equipment Company, Inc., Philadelphia, Pa. It is called the Freeburg Heel-less Safety Switch. The throw is made through the medium of a camshaft set in the switch block. This operates two tongues vertically. The use of two tongues eliminates the usual heel of other type switches and provides an unbroken main-line rail as well as unbroken curved rail. One tongue counterbalances the other, so as to provide for a simple and easy throw, whether by hand or automatic operation. The elimination of the heel prevents pounding which results in breaking down the switch bed. Excessive noise, as well as wear and tear on car equipment, is also reduced. When thrown for either the curve or main line, the tongues are locked in position and the vertical action of the tongues between solid steel centers prevents splitting of switches.

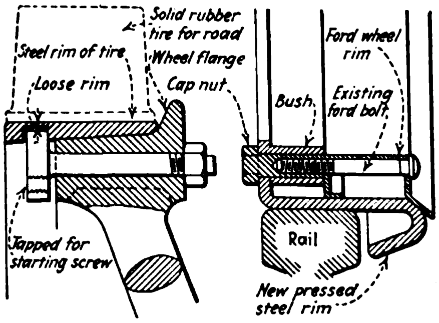


The Moving Part of This Switch Consists of Two Tongues and a Camshaft

Wheels for Either Road or Rail Service

A WHEEL system which can be converted from that used on highways to a form suitable for operating on rails is described in *London Engineering* for Oct. 12. The device is being manufactured under the trade name of "Motorailer" by the Motorailer Transport Company, Ltd., London, England. Two applications of the system are now in service.

One design shown in the accompanying illustration consists in using a motor wheel of the rail-car type made of high carbon steel. To convert this to a form suitable for road service, a tapered loose rim is used. This slips over the main rim of the wheel and forms an intermediate member between it and the steel ring at the base of the rubber tire. This loose ring is machined at an angle and is mounted in a manner similar to that used for holding piston rings. It is held in position by six ¾-in. hardened steel bolts with sector-shaped heads. These fit into a milled slot in the loose rim.



Wheel Rim Design for Use on Either Track or Road

Another design of rim construction is for use on a standard Ford truck. With this construction a pressed steel rail rim is attached to the wheel rim, the steel rim replacing the ordinary detachable rim generally used with rubber tires. An accompanying illustration shows the type of construction and method of fastening.

Non-Magnetic Cast Iron for Resistance Grids

NON-MAGNETIC cast iron has been produced by Messrs. Ferranti, Ltd., Lancashire, England, and has been patented by them in Great Britain and the United States. Its registered name is "Nomag." The magnetic permeability is practically the same as brass, while its electrical resistance is 50 per cent greater than ordinary cast iron. This combination in one metal is of advantage in electrical machinery construction. An increase of temperature causes a slight reduction in the permeability of the metal.

The mechanical properties generally are the same as cast iron, but Nomag has advantages in greater toughness and malleability, which are observable both in its high transverse deflection and in its resistance to shock. These qualities render the metal peculiarly suitable for resistance grids, especially when used for electric railway purposes.

In the design of electrical machinery and apparatus non-magnetic metals such as brass, gunmetal and aluminum are used where an alternating or rotating flux is present, in order to avoid hysteresis. The metals are not only relatively expensive but, as they are good conductors of electricity, they are susceptible to eddy currents.

The new metal is similar in appearance to ordinary gray cast iron and can be cast with the same facility and with the ordinary foundry equipment, although its shrinkage is 3/16 in. per foot as compared with ⅛ in. per foot for ordinary cast iron. It compares very favorably with ordinary cast iron in machining.

Association News & Discussions

Progress in West Virginia Railway Electrification*

By Stephen Q. Hayes
General Engineer Westinghouse Electric & Manufacturing Company

WEST VIRGINIA is one of the most important states of our country from a power development standpoint, and must be considered as a pivotal point around which will doubtless center a large part of the superpower system that may ultimately tie together all the Eastern and Southern sections of the United States.

The coal deposits of a single county of West Virginia if sold at $2.50 per ton would clear off the national debt of the United States. The water powers of West Virginia have been practically untouched, as the demand for power in the sections near such power sites has not warranted development. It most cases it has seemed more economical to generate the power by steam used in local power plants or in larger stations transmitting to the point of utilization. Later it may prove highly desirable to develop all possible water power so as to conserve the supply of coal, and to transmit power electrically from such water-power plants to points where it can be utilized advantageously.

The demand for West Virginia's coal for domestic and foreign use is such that anything that may be done to improve the coal-handling facilities of the important railways traversing the state is of vital importance to all users of coal. The Norfolk & Western Railway has already electrified its Elkhorn grade, relieving the congestion formerly existing at that point and greatly increasing the possibility of coal shipment over that railroad. The Virginian Railway is now arranging an extensive electrified section, while the Baltimore & Ohio and Chesapeake & Ohio railways are laying their plans for similar work.

The report of the Hoover super-power conference brings out the advantages to be gained by interconnection, and great economies in distribution through the interchange of loads between neighboring systems, securing a reduction of the amount of reserve equipment needed by having a better load factor. In the super-power survey made in the Northeastern States under the direction of W. S. Murray, it was calculated that the super-power systems proposed would conserve about 50,000,000 tons of coal per annum, with an annual saving of $500,000,000 at an additional capital outlay of $1,250,000,000.

Electrification of the railroads and a direct connection between them and the power resources available will be considered by the Giant Power Survey Board of Pennsylvania. One-third of the present railroad haulage in Pennsylvania is coal. By eliminating much of this low-grade freight the railroads will be free for other purposes.

The electrification of the Elkhorn grade on the Norfolk & Western Railway has now been in service for such a length of time that the benefits are fairly well known. The purpose of this substitution of electricity for steam was to increase the capacity of the railway line by materially reducing the time required to handle trains, and also to provide a more economical and efficient service over the heavy grades. With this end in view, the electric locomotives were designed to handle the heavy freight trains up the grade at a running speed of 14 m.p.h. as compared with about 7½ m.p.h. under steam operation.

Two Electrics Do the Work of Three Steam Locomotives

The coal trains formerly handled in this service weighed 3,500 tons and were hauled up the grade by three Mallet steam locomotives. Two of these, a road engine and a helper, were used over the entire division. The third engine located at the rear served as a pusher at the 1.5 per cent and 2 per cent grades, and was cut off at the summit. Now a single electric engine is used over the electric division, and a second electric engine is used as a pusher up the heavy grade. One electric engine, therefore, takes the place of two Mallets over the division; and two electric engines take the place of three Mallets up the grade. A 4,800-ton train has been hauled in this manner. The constant-speed feature of the locomotive is considered a decided advantage in dispatching traffic through the single-track tunnel.

In all cases, the electric locomotives handle the train at approximately double the speed obtained with steam. On the 9-mile grade between Cooper and Graham, where the maximum rise is 0.4 per cent, and some stretches are level, the speed of the electric locomotive is 28 m.p.h.

The electric installation was designed for handling a daily total of twenty eastbound trains of 65,000 tons over the division, and ample provision was made for additional traffic and extension of the electrified track when required.

A notable achievement on this electrified section was the handling of 90,000 tons eastbound over the Elkhorn grade and through the single track tunnel at the summit in a single day.

The increased train speed and reduction in road delays obtained with the electric locomotive have greatly increased the track capacity on the mountain grade section. The officials of the Norfolk & Western Railway have stated that the electrification approximately doubled the track capacity of the electrified section and that the capacity of their entire system has been materially increased due to the speeding up of traffic on the grade section.

Another notable railway electrification of vital interest to West Virginia is that of the Virginian Railway, which has been recognized as a leader in mass transportation. This railroad is today operating the heaviest trains in the world with the most powerful steam locomotives. It is handling approximately 7,000.000 tons of coal per year, but the potential capacity of the mines it serves is far in excess of this amount and extensive new mine developments are under way.

The initial electrification of this railway will extend from Mullens, W. Va., where the coal is collected from nearly all of the mines served, over the heavy grade section to Roanoke, Va. There is an equivalent 2 per cent grade for approximately 10 miles just east of the western terminus of the electrification. This hill section is double track, but the remainder of the line is single track. The electrification will cover a route distance of 132 miles, and the track mileage to be electrified is approximately 213.

Under the present plan of steam operation, trains of maximum weight of 5,500 tons are hauled from the Elmore yard to the top of the hill at Clark's Gap with two Mallet pusher engines of the 2-10+10-2 type and a road Mallet engine of the 2-8+8-2 type. The speed on the heaviest grade section is 6 to 7 m.p.h. From Clark's Gap to Princeton, this train is handled by the road locomotive. At Princeton, which is an engine terminal, trains of a maximum of 8,500 tons are made up and taken east to Roanoke with the same road engine and a helper out of the Princeton yard, and up the Allegheny mountains from Whitehorne to

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*Abstract of a paper presented at the Charleston meeting of the West Virginia Public Utilities Association, Nov. 9, 1923.

Merrimac. These Mallet pusher engines have a tractive power rating of 147,000 lb., operating compound, with a weight of 617,000 lb. on their drivers, and a total weight of engine and tender of 898,000 lb. The Mallets used as road engines have tractive power rating of 101,000 lb.

With the contemplated electric operation, trains of 6,000 tons will be handled from the Elmore yard to Clark's Gap with one road locomotive and one pusher, each being composed of three cabs or units. The speed will be 14 m.p.h. At Clark's Gap trains will be filled out to 9,000 tons, and the road locomotive will take this train all the way to Roanoke without a helper at a speed of either 14 or 28 m.p.h., depending on the grade and alignment conditions.

Each locomotive unit will weigh approximately 200 tons, and the weight per driving axle will be 75,000 lb. Each unit will have a continuous rating of 1,700 hp. at 14 m.p.h., and 2,000 hp. at 28 m.p.h. These electric locomotives are of the so-called split-phase type similar to those used on the N. & W Power is supplied from a single-phase trolley at a frequency of 25 cycles at either 11,000 or 22,000 volts.

Since the driving motors of these locomotives are of the induction type, the locomotive automatically becomes a generator and returns power to the trolley when the train tends to drive the motor above synchronous speed on descending grades. In this case, the speed rises slightly with load, but the total variation from maximum load motoring to maximum load generating is only about 10 per cent.

TURBO-GENERATING STATION TO SUPPLY POWER

Power for the Virginian electrification will be supplied from a steam turbo-generating station to be installed by the railway on the New River at Narrows. The initial capacity of this plant comprises four units, each with a maximum rating of 15,000 kw.

Two single-phase, 88,000-volt transmission lines carried on steel towers will supply outdoor transformer stations along the right-of-way, where the voltage will be stepped down for the trolley supply.

The initial power supply equipment will be sufficient for handling approximately double the present tonnage and sufficient for a maximum day traffic of 60 per cent in excess of the average corresponding to that figure.

Moreover, while three locomotive units will normally be coupled to form a service locomotive for handling 9,000-ton trains initially, the locomotives are so designed that four units may be coupled to handle 12,000-ton trains when the rolling stock is improved so that trains of that weight are feasible.

Power is to be supplied from a single-phase trolley at a frequency of 25 cycles and 11,000 volts. The locomotives and transformers and the distribution system are so designed that when trains of 12,000 tons are handled, the trolley voltage can be changed to 22,000 by making a simple change in the transformer connection.

As the Virginian Railway and the Norfolk & Western Railway parallel each other for a considerable distance on either side of the New River and are only a short distance apart at other portions of their lines, the use of the same general scheme of electrification on the two lines will permit the ready interchange of power between these systems in case of necessity and will allow each system to act essentially as spare capacity for the other.

There is a tie connection between the Appalachian Power Company and the Norfolk & Western Railroad through the frequency changer equipment at Switchback, and there may be a similar connection to the Virginian. The probable interconnection between the Appalachian Power Company and Virginian Power Company at Scarboro, and the future tie connection between the Virginian Power Company, the Kentucky-West Virginia Power Company and other power systems may ultimately lead to a general interconnection of the railway and power systems throughout West Virginia and the neighboring states.

In addition to the Norfolk & Western, and the Virginian Railway, the Baltimore & Ohio Railroad has been seriously considering electrification of certain portions of their lines in West Virginia. At present, the general limiting conditions for the B. & O. are not due to conditions on the railway lines as they now exist in West Virginia, but the terminal facilities at the ports on the Atlantic seacoast. Particular sections in West Virginia can be greatly improved by electrification.

In a somewhat similar manner, terminal facilities for the Chesapeake & Ohio Railway are possibly limiting features rather than their lines in West Virginia.

However, when the terminal facilities of the B. & O. and the C. & O. railroads at the seaboard have been increased it will then be advisable to increase their railway facilities.

West Virginians Hold Annual Convention

THE Public Utilities Association of West Virginia held its eighth annual convention in the Kanawha Hotel at Charleston, W. Va., on Nov. 9 and 10. A number of papers of particular interest to electric railway men were presented.

W. R. Power, general manager Ohio Valley Electric Railway, Huntington, W. Va., explained various methods of curtailing accidents caused by either mechanical or human errors. He urged every member to install every real safety device on machinery, as the cost would be but small compared to safety, and he urged that all see that the employees use the safety equipment provided for them.

Martin J. Insull, vice-president Middle West Utilities Company, Chicago, declared that the two most essential needs of the public utilities are favorable public opinion and finances to permit them to provide the public with the service it demands. Most Americans, he said, were in what might be classed as a commodity business, which turns its money over several times in the course of a year, while the public utilities turned their money over but once in five years. Thus talk of profits in utility business to a commodity man was something he couldn't really understand. Profits made him think of lower rates.

The speaker said this was because utilities are a natural monopoly. The monopoly, which sometimes puzzled the public, was an economic-born thing, he said. Builders couldn't afford to install two systems of gas, electric light and telephone. One was enough, and this creates the monopoly. To make this popular, companies must do more than provide the right kilowatt hours and legal service. The public naturally falls into ways of shopping around and is antagonistic to a monopoly, unless it was impressed with its benefits. This imposed a duty on the utility companies, Mr. Insull said.

Alexander Forward of the Virginia Corporation Commission, Richmond, Va., talked on "The Future of Public Regulation." He said he had yet to find a public utility problem of rates that could not be satisfactorily arbitrated on behalf of the public.

Stephen Q. Hayes, Westinghouse Electric & Manufacturing Company, read a paper on super-power development and railroad electrification which is abstracted elsewhere in this issue.

Other speakers included J. A. Morris, district manager American Railroad Association, Cincinnati, Ohio, on "Relation of Railroads to Utility Commissions"; W. B. Clarkson, general commercial superintendent of the C. & P. Telephone Company, Washington, D. C., "Gaining Support of the Public"; Harry Reid, president Interstate Public Service Company, Indianapolis, Ind., "Electric Interurban Possibilities," and John S. Bleeker, who explained publicity methods of the Indiana, Columbus & Eastern Railway.

The association elected the following officers: C. H. Brues, Wheeling, president; Mentor Hetzor, Moundsville, W. R. Power, Huntington, and J. E. Harsh, Charleston, vice-presidents; A. M. Hill, Charleston, treasurer, and Bliss McCrum, Charleston, secretary

Pennsylvania Street Railways Association

THE Pennsylvania Street Railways Association will hold a convention at the Penn-Harris Hotel in Harrisburg on Dec. 4.

American Association News

Executive Committee

AN ENTHUSIASTIC meeting of the executive committee was held at association headquarters, New York, on Nov. 16. The members present were President Britton I. Budd and Executive Secretary Welsh, C. D. Emmons, W. H. Sawyer, R. P. Stevens, J. H. Pardee, J. N. Shannahan, C. E. Morgan, F. R. Coates, J. H. Hanna, C. L. Henry, L. S. Storrs, Paul Shoup, Gen. George H. Harries, A. W. Brady, C. R. Ellicott, M. B. Lambert for H. D. Shute, A. A. Hale, Barron Collier, C. S. Hawley, H. A. Johnson, J. K. Punderford, E. M. White and W. H. Hyland.

Mr. Pardee reported for the finance committee that the association's finances are in very satisfactory condition. A budget was recommended for 1924 and approved by the executive committee. This carried with it provisions for an increase in salaries of approximately 11 per cent for virtually the entire association headquarters staff, an increase in salary for the executive secretary, the renting of additional floor space. The committee also made recommendations as to the investment of certain surplus moneys. President Budd said that he had had the Bureau of Commercial Economics examine the conditions at headquarters, without expense to the association, and had received a report which spoke very highly of the efficiency of the personnel and the manner in which work was being conducted, but criticised severely the cramped office arrangement and lack of space for efficient operation. Mr. Budd said he thought it would be necessary for the association to move to some other building at the expiration of its present lease, with the idea in mind of setting up an office that would possibly serve as a model for railway men to come to.

Mr. Stevens reported for the committee appointed to nominate a new member of the executive committee to fill his unexpired term arising out of his election as vice-president. The committee recommended the appointment of Harry Reid, president Interstate Public Service Company, Indianapolis, and the executive committee approved. A motion was made and adopted that it was the sense of the executive committee that the election of a member of the executive committee to fill the unexpired term of another member should not be construed to prevent his re-election to fill one full term.

Mr. Storrs reported for the special sub-committee appointed to consider the association's relationship to the motor vehicle industry. The committee recommended that the executive committee accept the offer of the manager of the National Automobile Chamber of Commerce to organize a committee of that body to co-operate with the railway association for mutual benefit, and made the suggestion that a committee of the railway association confer with a similar committee of executives of the National Automobile Chamber of Commerce for the purpose of considering further the working out of the suggestions.

In regard to the invitation of the Society of Automotive Engineers to cooperate in the development of standards, it was recommended that this be referred to the railway engineering association with instructions to appoint a committee for that purpose. Other matters of co-operation were left for the consideration of the above joint committees to work out in conference. The executive committee adopted these recommendations.

President Budd added to the report of this sub-committee that it was his feeling that the bus manufacturers want the co-operation of the American Electric Railway Association. He said that there is a very strong feeling that the future great market for buses is going to be through the electric railways. In time the railways are going to dominate the situation. If the manufacturers generally realize that the great market for their product is the electric railway field and find that their output is going to be taken there, they will be inclined to co-operate with the association in fostering the use of buses in non-competitive services.

Mr. Shoup expressed the view that if the manufacturers are willing to cooperate, that is very good, but there is no evidence of it yet in California. He said that much of the difficulty there has been caused by the granting of extensive credit by bus manufacturers If they are willing to cease that sort of thing the railways will be glad to co-operate with them, but whether this is a fact is to be determined.

President Budd expressed the view that the association ought to have a continuing committee to study the whole bus situation and the best way of working out the railway problems jointly with the motor vehicle industry. The executive committee approved the appointment of such a committee and President Budd named the following members: L. S. Storrs, chairman; C. D. Emmons, F. R. Coates, Paul Shoup, A. W. Brady, J. G. Barry and M. B. Lambert.

MID-YEAR MEETING AT ST. LOUIS MARCH 4

Mr. Lambert, reporting for the special committee on date and location of the Mid-Year Meeting, recommended that St. Louis be selected as the place and Tuesday, March 4, as the date. He said that St. Louis has adequate hotel facilities, is near the geographic center of the railway field, and the conditions in St. Louis are deserving of this honor more than any other city that has not recently been the center of an association meeting. The executive committee approved these recommendations.

President Budd requested authorization to appoint two new committees, one on city operation and one on interurban operation to cover in a comprehensive way, so that it may be disseminated to other member companies, information as to progressive operating methods and equipment, with the idea of speeding up the modernization program in the industry. A more elaborate description of the organization of these committees will be published next week.

Mr. Welsh reported that the American Committee on Electrolysis had recently met in Chicago to consider the advisability of renewing its work. The consensus of opinion was that the work should go on and a resolution was adopted authorizing Chairman Bion J. Arnold to communicate with each association having representation on the electrolysis committee and ask that it reaffirm the appointment of its representative and its intention to support the work financially. The executive committee approved the continued support of the A.E.R.A.

The executive committee discussed at some length the question of whether it should indorse the National Transportation Institute and encourage membership of electric railway companies in that organization. Bert M. Robinson of the Transportation Institute was invited to speak before the committee and he outlined its purposes and answered various questions. As there was insufficient time to give the matter full consideration and as it was realized that the proposed work is an extremely important one, action was deferred to a subsequent meeting and President Budd appointed a special committee consisting of P. H. Gadsden, C. D. Emmons, Paul Shoup, J. H. Hanna, F. R. Coates and W. H. Sawyer to give the matter further study and report back with a definite recommendation.

Mr. Emmons reported for the committee on the Charles A. Coffin prize, recommending that an award of merit be sent to each contestant whose brief contained one or more contributions of special value to the industry; that the committee give further consideration as to which companies should receive these awards of merit; that a letter of appreciation be sent to each of the seventeen companies which took part in the 1923 contest; and that the briefs be edited and prepared for possible publication in book form at the expense of the association. The executive committee approved all of these recommendations.

President Budd was authorized to appoint a special committee on arrangements for the Mid-Year Meeting.

President Hyland of the Claims Association requested approval, which was granted, to appoint a new committee of the claims association which would undertake to bring about uniform grade crossing laws.

The next meeting of the executive committee will be on Jan. 18 at association headquarters, New York, at 10 a.m.

The News of the Industry

Los Angeles After Subways

Railroad Commission Holds Hearing on Projected Subway System of Pacific Electric Lines

The California Railroad Commission held a hearing in Los Angeles on Oct. 29 on the application of the Pacific Electric Railway for authority to construct a rapid transit subway in Los Angeles from its present Hill Street passenger terminal to Glendale Boulevard. The railway sought permission to proceed with its original plan to construct the subway as proposed to come to street grade at its Hill Street terminal.

The railway stated to the commission that it had expended $800,000 for rights-of-way and had the funds in hand to proceed at once with its original plan with the view of giving relief to the congestion on Hill and Sixth Streets in Los Angeles, and for the purpose of furnishing rapid transit service between Los Angeles and Hollywood, as well as San Fernando Valley points; that the subway would take 116 interurban trains a day off of Sixth Street alone; that the work could be started immediately of digging the bore and completed within eighteen months, should the commission see fit to act favorably on the company's application.

DIFFICULTIES BEFORE CITY

As an alternative proposal the suggestion was made that the eastern terminus of the proposed subway might be diverted southward to Pershing Square. The company explained that the alternative proposal was submitted primarily to meet prevalent views that such a tunnel ultimately should become part of a general system of subways.

The city of Los Angeles in presenting its views to the commission indicated that many obstacles had to be removed before it could entertain further authorization of the terminus underneath Pershing Square. First, there were charter provisions to be met. In addition there were engineering problems to be overcome. It was outlined by the city's representative that Pershing Square would have to be excavated with steam shovels and then be remade, and if the requirements of the Park Department were met the station in the park would be 35 ft. below the street level.

It developed at the hearing that the board of engineers, representing the city of Los Angeles, the Los Angeles Traffic Commission, the Los Angeles Railway and the Pacific Electric Railway, had been unable to agree. This board was appointed thirty days ago to endeavor to bring about an agreement regarding a comprehensive subway system for the city of Los Angeles. In the absence of such an agreement it is evident most any plan will be favored that can be carried out at once.

It is stated that any comprehensive subway system would cost the city from $5,000,000 a mile upward with a total expense of $100,000,000 for from 20 to 40 miles of line.

Super-Power Plant for Davenport

A super-power plant generating at least 200,000 hp., for consumption in the Tri-Cities and for long-distance transmission, will be located on the banks of the Mississippi River 2 miles above Davenport. Formal announcement to this effect has been made by B. J. Denman, vice-president and general manager of the United Light & Railways Company.

Located along the right-of-way of the Clinton, Davenport & Muscatine Interurban Railway and also along the line of the Milwaukee road, the power site will be easy of access for coal deliveries. It will also have river wharfage in case coal barge transportation on the Mississippi from lower Illinois and Ohio River mines proves practical in the future.

The first section of the new plant will be 160 x 220 ft. in ground dimensions and 110 ft. in height, of concrete and steel construction with brick exterior. The initial capacity will be 35,000 hp.

The engineering and construction work will be done by the United Light & Railways Company construction forces, the completion of the power plant and dam at Iowa City and the new power house at Fort Dodge making it possible to concentrate construction equipment and forces on the new Tri-City plant.

New Public Service Plan Not Yet Ready

Statements are unofficial which were made in the daily newspapers of Nov. 12 and 13 indicating that the Public Service Railway contemplates putting sixty buses in operation at this time in northern New Jersey. As has been indicated before, the company has in preparation a new plan looking toward unified railway and bus operation in New Jersey, but it appeared unlikely on Nov. 14 that this plan would be ready to be announced for a week or ten days. Out of terms they thought might be included in the forthcoming statement by the company, the newspapers of Nov. 12 and 13 built up and published a story that had the appearance of having been obtained from official sources.

Subway Amendment Carries

Detroit Electors Approve Proposal to Permit Construction of Subway or Elevated Lines

Two charter amendments carried at the Nov. 6 election in the city of Detroit have an important bearing on the city's street railway system.

One amendment, called on the ballot the "Subway Amendment," allows the city to bond up to 4 per cent additional to all other purposes for the construction of a rapid transit system, either subway or elevated. The other amendment permits the Street Railway Commission to sell property and equipment no longer needed by the system, and requires that the proceeds from the sale of such property be reinvested in other equipment and capital assets, or that it be so applied as to reduce the street railway's bonded indebtedness. Property now held by the commission and regarded now as salable has an estimated value of $500,000.

The Subway Amendment, which required a 60 per cent favorable vote, was carried with a margin of 7 per cent. The other street railway measure was carried by a margin of 11 per cent.

Although called the "Subway Amendment," the measure which paves the way for rapid transit in accordance with the Culver-Wilcox bill passed by the Michigan State Legislature a year ago provides also that the city may own, operate and maintain an elevated railway. Under the terms of the amendment the city is authorized to proceed with plans for the construction of a rapid transit system and to finance construction by an issue of bonds for more than $80,000,000 at 4 per cent of the present valuation of approximately $2,100,000,000.

Power is conferred upon the city to make an initial appropriation to plan and fix routes; to make the city's annual assessment roll show in a separate column the assessment on any property because of the subway and the assessment on any property built and acquiring its assessable value because of the subway; to exercise the power of eminent domain if necessary for the purpose of the subway; to transport therein persons and property and to construct, own and maintain, with like powers, privileges and limitations, an elevated railway.

The Subway Amendment also provides for a board of three members called the subway board, appointed by the Mayor by and with the advice and consent of the City Council. The salary provided for the members of the board is not less than $10,000 a year each, until the work of constructing the subway is completed, after which the board's members shall serve without pay.

Mayor Frank E. Doremus was reelected. He received about 90 per cent of the votes cast for Mayor.

Service Changes and Jitney Regulation Recommended

John A. Beeler, reporting to the city of Houston, says that faster service, rerouting of several lines and a redistribution of cars will effect economies that will result in increasing the earnings of the Houston Electric Company. He says, however, that a complete solution of the transportation problems of Houston will be impossible so long as the jitneys are allowed to operate as at present.

The report is in two parts. One covers the details of the railway situation and the other deals with the jitney problem.

Some of the things which Beeler suggests are a few changes in present lines of the company, the adoption of all double truck one-man cars on all lines except the Liberty, the abolition of the present plan of making sixteen stops to a mile, the elimination of all unnecessary delays, more stringent regulations regarding transfers and the placing of men in the downtown districts to assist in loading and unloading passengers during the rush hours. He estimates these changes will increase the earnings to $602,000.

Mr. Beeler states in his report that he has made a careful survey of the railway situation from every angle and that the suggestions which the report contains will tend to reduce the operating cost and increase the desire of people to ride.

On jitneys, Mr. Beeler says:

> A plan successfully adopted by many regulatory bodies is to limit jitney service to territory where the railway service is inadequate and unsatisfactory.
>
> Among other things that are desirable in order to bring about better conditions are the following: A bond of at least $10,000 should be required of each jitney to cover personal injuries and other liabilities; loading should be limited to the seating capacity, and the matter of taxation should be equalized between the two systems.
>
> The jitneys in nearly every case operate along the railway routes in the old settled and comparatively close-in districts. They receive 6 cents for a single short haul ride, while the railway, which serves the outlying territory, receives an average of 6.45 cents for a much longer ride, and furnishes a free transfer if desired.
>
> The jitneys run 55 per cent faster than the street cars. Because of this saving in time the people will put up with intolerable crowding and take chances on personal injuries. The public demands rapid transportation and the railway will suffer as long as it cannot supply that demand.

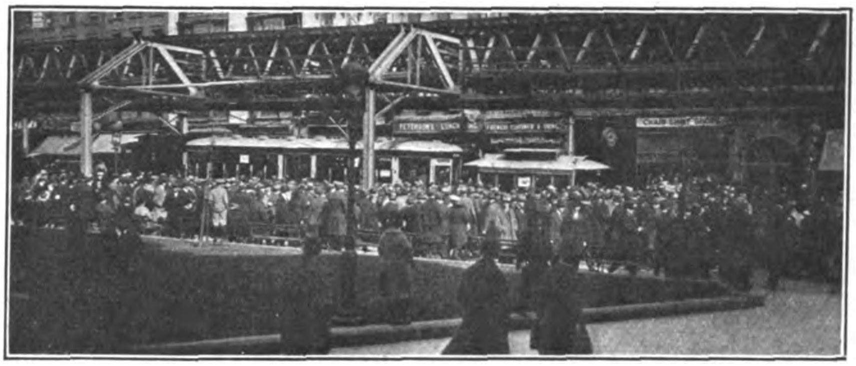
Mr. Beeler says that the solution lies largely within the power of the railway. It must revamp its slow, halting service, eliminate the unnecessary stops and delays and reduce the waste in all the factors involving the time element.

The report by Mr. Beeler was made in connection with the action by the company against the city to secure greater revenues.

Old and New Side by Side in Brooklyn

A half century's advance in street railway transportation in Brooklyn was pictured on Nov. 1, when the Brooklyn City Railroad placed on public view at Borough Hall a horse car of 1868 and one of its new front-entrance, center-exit, pay-as-you-pass cars, described in detail in the issue of the ELECTRIC RAILWAY JOURNAL for Oct. 27, page 739.

Following an inspection at the Fifty-eighth Street carhouse by Transit Commissioner LeRoy T. Harkness and other representatives of the Transit Commission, as well as by officers of the United Railways of Baltimore, the "Brooklyn," as the new car is known to the railway industry, was run to a siding at Borough Hall.



Contrast in Cars Collects Crowds

There it was joined by the old horse car, long since discarded, and manned by John Orleman of 170 Snyder Avenue, one of the few surviving drivers of horse cars in Greater New York. Snyder, who recently retired with "a perfect record" after forty-seven and a half years of service, wore a part of the garb and used the same whip that was a part of his equipment when, after apprenticeship as a towboy, he worked as a driver on the Flatbush Avenue line.

The oil lamps of the car of the days following the Civil War contrasted strongly with the lurid front of the 1923 car. Between the vestibule windows and bumper of the latter the dash is painted a peacock blue, and, from the headlight as the center, there radiated a series of irregular streaks, producing a weird but striking effect. The new car, built for heavy city traffic, and designed from experience in Brooklyn surface transportation, is 44 ft. long over bumpers and seats fifty-three passengers. This is said to be the largest seating capacity yet attained in a car of this size. Two of the cars have already arrived and 200 of them will be in operation before 1924.

The old car was towed from its refuge in Fifty-eight Street to be exhibited with its modern companion, from 11 a.m. to 7 p.m. Many thousands of the Brooklynites viewed the spectacle before the veteran driver conducted his charge back to the carhouse that night.

The 200 new cars, part of a progressive betterment program being carried out by the Brooklyn City Railroad, represent an outlay of more than $3,000,000. They are painted red and are trimmed with yellow. Each car costs approximately $15,000. The cost of the old horse car which was shown in contrast to the new vehicle was about $650.

Railway Tangle in Monterey

Transportation facilities in the vicinity of Monterey and Pacific Grove, Cal., are at present in an unsatisfactory condition. The difficult situation in which the Monterey & Pacific Grove Railway finds itself dates back to July, 1922, when the City Council of Pacific Grove brought suit against the railway praying for the annulment of the franchise. Its complaint was based upon non-payment of franchise taxes amounting to $605 and the abandonment of a portion of line along Nineteenth Street to the Southern Pacific Depot, about half a mile, which could not be operated at a profit. Judgment was rendered in November, 1922, in favor of the city of Pacific Grove and the company's franchise was declared forfeited.

The railway continued to operate until Sept. 11, 1923, on which date the company was served with an injunction prohibiting the operation of cars within that city. Since Sept. 11 cars have been operating from the city line of Pacific Grove through the city of Monterey to Del Monte.

The city of Pacific Grove signified a willingness to grant a new franchise provided the railway would lay new ties and rails and pave the streets for a width of 9 ft. along its right-of-way. This the company declared it could not do owing to its unfavorable financial condition and the unfair requirement of paving.

Bus operation has also played a part in the controversy. At the time the city brought suit for annulment of the company's franchise there was a bus line operating between the two cities at a 10-cent fare. The bus line failed financially twice in fifteen months. The bus line is now operating at a 5-cent fare between the business district of Monterey and Pacific Grove, but it does not furnish local service to Del Monte.

Renewal of Marietta Franchise Grants Approved

Residents of Marietta, at the election on Nov. 6, defeated the referendum petition prepared in opposition to the Monongahela-West Penn Public Service Corporation. As a result the company will continue its operations there and carry out the proposed improvements as soon as possible.

The City Council of Marietta recently passed three orders: One authorized the renewal of the interurban franchise held by the company, another renewed the franchise for railway operation in the city and another renewed the lighting franchise.

Action of the Council on these matters was questioned by some of the residents of the city and a petition was prepared for a referendum. It was this referendum which was defeated in the election. The civic clubs of Marietta were active in the campaign for the service of the company. The Rotary Club, Chamber of Commerce, Woman's Club, Kiwanis and Ad Clubs prepared advertising setting forth the probable condition of Marietta without the services offered by the company and stating the proposition which was made.

The company proposes not only to operate the railway system in the city, but to supplement this with bus service.

New York Central Seeks Electrification Details

Applications by the New York Central Railroad to the Public Service Commission for an order specifying detailed methods of electrification of its steam lines in New York City and to the Transit Commission for elimination of all its grade crossings under the general grade crossing law were made public on Nov. 11. The two applications, which were made necessary by the Kaufmann law requiring the electrification of all railroads in New York City, reopen the question of the relocation of the New York Central's tracks on the west side of Manhattan and the removal of the danger of tracks at grade on so-called "Death Avenue."

In its application to the Transit Commission the New York Central has asked that the expense of eliminating the grade crossings on its west side tracks, estimated at from $15,000,000 to $25,000,000, be borne one-half by the company, one-fourth by the city and one-fourth by the State, under the provisions of the general grade crossing law. By special laws, enacted in 1911 and 1917, the company is required to meet the expense of track relocation alone.

George McAneny, chairman of the Transit Commission, expressed doubt that the grades could be changed under the general statute in view of special legislation on the same subject, and said he did not believe that there would be any satisfactory solution of the west side problem or any of its phases until the railroad accepted the principle of the special acts and paid for an improvement from which it would derive great gain. Mr. McAneny said, however, that the Transit Commission would fix an early date for a hearing on the company's application and might unite with the Public Service Commission in a joint hearing.

The application of the New York Central to the Public Service Commission for an order specifying detailed methods of electrifying its steam lines in the city mentions as such lines its west side freight line from Spuyten Duyvil to St. John's Park and its Putnam Division. Freight trains on the Harlem Division also are operated by steam.

$500,000 a Year More for Chicago Trackmen

Union shop and track employees of the Chicago Surface Lines have been granted an increase in wages by the arbitration board, which settled the wage controversy that resulted in a strike during the summer.

The wage increases average 8 cents an hour for the 2,200 men involved. They mean an increase in the annual payroll of the railways of approximately $500,000.

The old and the new wages of craftsmen who will benefit by the increase follow:

	Old	New
Wreck wagon drivers (horse)	$5 a day	$5.80 a day
Wreck wagon drivers (motor)	$5.20 a day	$6 a day
Carpenters, per hour	54 to 81 cents	64 to 91 cents
Painters	75 to 83 cents	85 to 93 cents
Electricians	90 cents	$1 an hour
Linemen	$1.10	$1.20
Blacksmiths	87 to 92 cents	97 to $1.02
Armature winders	90 cents	$1
Machinists	83 to 95 cents	93 to $1.05
Sheet metal workers	85 to 90 cents	95 to $1
Track dep't foremen	67 cents	73 cents
Pavers	62 cents	68 cents
Track dep't laborers	54 cents	60 cents
Watchmen	39½ cents	45½ cents
Moulders	81½ cents	91½ cents

The new wage agreement is for one year and is retroactive to Aug. 1, 1923. This is the second wage increase given employees of the Chicago Surface Lines this year, 13,000 trainmen and other employees receiving a 3 cents an hour increase after an arbitration hearing early in the summer.

Sum Appropriated for Engineering Education

The Carnegie Corporation of New York made an appropriation of $108,000 recently for the study of engineering education to be conducted by a director responsible to a committee of the Society for the Promotion of Engineering Education. The resolution adopted by the corporation sets aside for the purpose $24,000 during the present fiscal year and $12 000 during the fiscal year 1924. W. E. Wickenden has been chosen to conduct this work. Mr. Wickenden is assistant vice-president of the American Telephone & Telegraph Company. From 1909 to 1914 he was assistant professor of electrical engineering at the Massachusetts Institute of Technology and associate professor until 1918.

Public Utility Study Courses Expanded

The Institute for Research at Madison, Wis., in co-operation with Wisconsin University, proposes to expand the study of public utilities so as to put more emphasis on research and individual instructive work.

The proposed program, Prof. Martin G. Glaeser of the Institute staff explains, has a threefold emphasis: A general liberal education; selection of courses which will provide training in method; acquaintance of student with the historical, legal, economic and factual background of the field. Professor Glaeser contends that instruction representing greater detail tends in the direction of the vocationalism and should, therefore, be discouraged. He said:

> Special courses in transportation have long been an integral part of the graduate and undergraduate instruction in economics at the University of Wisconsin. Coincident with the beginning of state regulation by commissions in 1905, the work was expanded to include instruction in the field of the local public utilities.
>
> Within the field of public utilities, opportunity can be given for a comprehensive survey course in the history and regulation of public utilities. This should include the local utilities along with railroads and national utilities generally in order to economize time and be available for those who have no interest in the work beyond its "public interest" features. This can then be followed with special courses in the administration of local utilities and railroads.

Burden of Rhode Island Wage Demand $3,000,000

An increase of $3,045,689 a year in operating costs of the United Electric Railways, Providence, will result, according to an estimate by the company, if the wage advance asked by the men is granted

The additional operating expense, according to the company's statement, would necessitate a 12-cent fare, or eleven tokens for $1, for transportation in the present zones.

Among the increases asked were the following:

Motormen and conductors from 58 cents an hour to 80 cents an hour.

Brakemen from 49.6 cents an hour to 65 cents an hour.

Trolley tenders from 28.7 cents an hour to 40 cents an hour.

Warehouse men from 49.6 cents an hour to 60 cents an hour.

Receiving clerks from 49.6 cents an hour to 65 cents an hour.

Cashiers from $28.75 a week to $40 a week.

Bill clerks from $26.75 a week to $35 a week.

An offer to arbitrate the new working agreement submitted by its employees has been made by the company to the union officials. The proposal was that the present agreement which expired at midnight Oct. 31, be continued until the arbitration board had considered the matter as presented by both sides and had then submitted its findings on the terms of the new proposal.

As was reported in the ELECTRIC RAILWAY JOURNAL, issue of Nov 10, the men are opposed to arbitration, but have renewed their request for a conference on their recently submitted draft agreement including a wage increase and the closed shop.

News Notes

Thirty-three Years Without Accident.—John Donahue, motorman, and John Murphy, conductor, of Peoria, Ill., are charter members in the "Safe Drivers Club." They have a record of thirty-three years as a railway crew without an accident of any kind. Since 1890 they have covered more than 1,250,000 miles together. They are known as the original "Safe Drivers."

Wins Paving Suit.—The city of New York has won its paving suit against the Union Railway by a decision of the Appellate Division of the Supreme Court, which rules that the company was not exempt from provisions of the law requiring street railways to keep in repair not only the space between the rails of each track, but the space between the tracks and for 2 ft. on the outside of each track. The result will be that the company will have to pay the city the cost of paving its entire roadbed area, which will amount to more than $100,000 a year above the amount conceded by the company. The suit heard by the court involved a claim of only $395 for work done on Melrose Avenue.

Examination Date Announced.—The United States Civil Service Commission will hold an examination on Dec. 5 to fill vacancies in the Bureau of Standards. The optional subjects for junior engineers include civil, electrical, mechanical and radio engineering.

Only Electric Trains in Tunnel.—R. H. Keays, chief engineer of the Moffat tunnel, which is to be a little more than 6 miles long, at a recent address before the Denver, Col., Civic and Commercial Association, explained that only electrically operated trains would use the Moffat tunnel and in consequence there would be no need for artificial ventilation. The work on the tunnel is going right along, both portals having been bored so far in that the winter snows will not interfere with further progress.

"At Your Service" Gives Facts.—The Virginia Railway & Power Company, Richmond, Va., has been running advertisements in the form of a bulletin in the *Times-Dispatch*, entitled "At Your Service." Bulletin No. 2 gives some facts with regard to the operation of the trolley in Richmond during September.

A "Make-Up" for the Ladies.—Every now and then the "Public Service News" published by the Winnipeg Electric Railway, will set aside an issue specially for ladies. The company says in the first number devoted to women patrons that it has endeavored to get a "make-up" as neat and as dainty as the sex to which it is addressed. A patron suggested the plan because from his observation the women were the worst offenders against speeding up service, etc. The Winnipeg Electric Railway declares that it does not share this view, but rather thinks the women observant of principles upon which good service is built.

Honor Men Listed.—Appreciation of long and faithful service given by ten veteran employees of the Indiana Service Corporation on the city lines of Fort Wayne is expressed by officials of the company through the formation of a "Personal Service Honor Roll." The ten men have service records ranging from twenty-five to more than fifty years and all are still in the service of the company. Cards bearing the names of these employees have been placed in all the city cars, under the caption "Personal Service Honor Roll." Four of the men were in the service of the company in the days of the old horse cars.

One Day off Without Pay.—Employees of the Seattle Municipal Railway lines will have one day off in eight, under a bill introduced in the City Council by Chairman E. L. Blaine of the finance committee. The bill calls on Superintendent D. W. Henderson to rearrange schedules to permit the day off without pay. This policy was agreed on by the budget committee two months ago.

Mountain Division Electrification Report Renewed.—From official sources it is learned that there is nothing new in the report from Pittsburgh to the effect that while no final plans have been adopted for the running of Pennsylvania trains by electricity in the mountains from the Conemaugh section to Altoona, it has reached the point of a definite intention to electrify parts of the Allegheny Mountain lines on both sides of the watershed, which begins at either Galitzin or Cresson.

Tells Its Own Story.—The Vicksburg Light & Traction Company, together with other utilities, is getting out some joint publicity on the things it is doing and for what it stands in the development of the city of Vicksburg, Miss. The railway is a member of the Louisiana-Mississippi Committee on Public Utility Information and suggests that patrons keep in touch with the committee if they want information about their railway property.

Reprints Into Book Form.—The North American Company, New York, N. Y., has put into book form various articles reprinted from the *Wall Street Journal* relating to that company's activities. The pamphlet is called "An Unusual Record of Achievement." It tells all about the company's earning power, expansion, etc.

Will Call Election.—Mayor McInich of St. Joseph, Mo., will call a special election to submit the proposed railway contract for furnishing electric current to the city for lighting purposes as soon as he receives a report from the State Public Service Commission that the form of the contract, which was contained in an ordinance passed by the Council, is approved. No bond issue is involved in the proposed election. The question will be merely whether or not the city will enter into a contract for electric current with the railway at a cost of 1.8 cent per kilowatt-hour for the first 500,000 kw., and 1 cent for all over that amount.

What Houston Is Doing.—How it served its patrons in 1891, 1901 and 1923 was shown by the Houston Electric Company in a recent advertisement in the Houston *Post* entitled "That Houston May Fulfill Her Destiny." Accompanying the pictures the company tells something of its accomplishments and aspirations. It states that from July 31, 1920, through July 31, 1923, the company spent about $7,000,000 in the extension, improvement and operation of the railway system.

One-Man Car Service Discontinued.—The Tacoma Railway & Power Company has discontinued its one-man car operated to Clover Park from Lake City, connecting with the American Lake line. The district is now served by a motor bus, operated by the City Transportation Company. Fare on the new bus line will be 35 cents one way, with a 25-cent rate to the Lakeside Club. Cars on the south side to Murray will continue as usual.

Ford Gives Another Loan.—The Ford Motor Company has again come to the aid of the city of Detroit by recently agreeing to advance another $2,000,000 to take care of electric railway extensions and to enable the city to meet payments on sewer work already contracted for. The recent loan brings the city's debt to the Ford company up to $5,000,000.

Names New Director of Bureau.—The Illinois Committee on Public Utility Information has announced the appointment of Keith Spade as director of its department of public speaking, known as the Public Service Speakers' Bureau.

Better Health Among Employees.—At a meeting of the board of directors of the United Railways, St. Louis, it was brought out that there was a great improvement in the general physical condition of members of the Employees' Mutual Benefit Association. Colonel Perkins remarked that the increased care of the fellow men was beginning to bear good fruit. For a period of sixty days recently there were no deaths reported.

Chair in Transportation Endowed.—Senator William B. McKinley, chairman of the board of the Illinois Power & Light Corporation, Chicago, Ill., has presented to the University of Illinois securities yielding $7,000 a year for the endowment of a chair in the economics of transportation.

Transit Plan Coming.—The Rapid Transit Commission at Detroit is making plans for the development of a financial and legislative program intended to further the rapid transit project. It has been announced that the commission hopes to develop a plan to finance a rapid transit system that will not be dependent for its success on the ability of the city to borrow within its present debt limits.

Financial and Corporate

Independent Receiver Sought

Holders of St. Louis & Suburban Bonds Want Road Separated from United Railways

Appointment of an independent receiver for the St. Louis & Suburban lines and segregation of those lines from the United Railways system of St. Louis are demanded by the foreclosure suit filed in the Federal court during the week ended Nov. 10 by holders of Suburban bonds on which default has occurred.

A separate valuation of the Suburban properties is demanded to determine among other things, whether the present rate of fare is too high or too low. In demanding an independent receiver the petition states that Rolla Wells, the receiver of the United Railways, is not qualified to act in that capacity for the Suburban, as he represents interests that conflict with those of the Suburban claimants.

The bondholders' committee, members of which appear as plaintiffs in the foreclosure suit, professes to represent about 80 per cent of the holdings of the $4,500,000 issue of general 5 per cent bonds of the Suburban, which matured on April 1 last, and have not been paid. Marion C. Early and Sam B. Jeffries appear as counsel for the petitioners.

The Mississippi Valley Trust Company, trustees under the Suburban general mortgage, heads the list of plaintiffs, and the individual plaintiffs, members of the bondholders' committee, are Herman C. Stifel, A. C. F. Meyer, J. L. Johnston, John G. Longmire, Craig McQuade and A. H. Reller.

The defendants named are the St. Louis & Suburban Railway, United Railways, St. Louis & Meramec River Railroad, St. Louis Trust Company, St. Louis Transit Company, Mercantile Trust Company, trustee, American Loan & Trust Company, Boston, and Rolla Wells, receiver of the United Railways.

The Suburban lines and those of the St. Louis & Meramec River Company, which are involved with them in the present proceedings, are the present Hodiamont, Sarah and Union lines of the United Railways, that part of the Manchester lines west of Sarah Street, and the Maplewood-Meramec, Kirkwood-Ferguson and Florissant lines in St. Louis County.

These lines, the petition states, form 15 per cent of the United Railways system, and furnish more than 15 per cent of its revenue, while their bonded indebtedness is less than 12 per cent of that of the entire system. The Suburban and Meramec lines were absorbed Dec. 31, 1906, by the United Railways, which thus obtained a complete monopoly of railway transportation in the city and St. Louis County.

The petitioners allege that in 1917 the United Railways charged $638,279 against depreciation reserve on account of two power plants of the Suburban which were closed without rendering any account of the proceeds of their disposition. This amount, it is alleged, was less than the Suburban lines' share of the United Railways depreciation reserve for that period. The petitioners say this reserve should have been at least $850,000, and the court is asked to order Receiver Wells to pay that sum, or a sum fixed by investigation, to the new receiver.

It is charged that the United Railways has operated the Suburban property to the profit of the entire system, rather than to that of the Suburban lines, and that this has been detrimental to the interest of the Suburban bondholders. A separate valuation was asked three times, the petition states, but was opposed by the company and the receiver.

The petition says the Suburban lines are capable of being administered independently of the United Railways, and for that purpose, it asks that Receiver Wells be ordered by the court to turn over to the Suburban the rolling stock and other equipment which it will need, and to furnish the needed power at cost. This can be done, it is stated, without detriment to the United Railways system.

Sam B. Jeffries, attorney for the Suburban group, gave out this statement:

> We have a mortgage on the best producing portion of the United Railways. Our interest on the mortgage is unpaid, and we are asking for our property, so that we can make it produce for us.
>
> The old Suburban lines were the biggest of the lines that went into the United Railways, and had the greatest potentialities. For instance, the Broadway, the Olive and the Cass lines served a community whose needs were already known. But the Suburban lines served growing communities—Florissant, Ferguson, Maplewood, Webster Groves, Kirkwood and the like—all needing development of the car service.
>
> The report of James E. Allison & Company, consulting engineers, shows that while the underlying bonds and mortgage total only $6,500,000, the minimum value of the physical properties is $7,500,000. We have a mortgage on a real paying property, and we want our money, or a chance to get it.

Receiver Will Show Railway's Worth.—The Norwalk-Shelby traction line, placed in the hands of a receiver on Nov. 3, will have a chance to prove its worth, according to Receiver E. G. Martin. Freight-carrying equipment will be added to the line and arrangements have been made with the Ohio State Power Company, Tiffin, to continue to deliver electricity to the power customers of the company by way of Plymouth.

Net Up $93,802

Third Avenue Railway, New York, Reports Gain for Year Ended June 30

For the fiscal year ended June 30, 1923, the operating revenue of the Third Avenue Railway System, New York, was $14,406,784, an increase of $265,371, or 1.88 per cent, as compared with the fiscal year ended June 30, 1922. The operating expense for the year ended June 30, 1923, was $10,726,984, an increase of $171,957, or 1.63 per cent, as compared with the previous year. The net income for the year recently ended was $301,276, an increase of $93,802 over the previous year.

The property earned during the fiscal year a fraction more than 6 per cent on the 5 per cent adjustment bonds and the directors authorized two interest payments of 3 per cent each, making 6 per cent for the year. Five per cent was for the current interest and 1 per cent a payment upon the accumulated interest on these bonds. There remains as interest still unpaid upon these adjustment bonds 20¼ per cent.

Slaughter W. Huff, president of the company, explains that there has been some misunderstanding as to the amount that is available for payment of accumulated interest on these bonds, due to the fact that all the company's cash or its equivalent in securities has been carried heretofore in the current assets account without reference to the amounts that were due to depreciation and contingencies and other reserve accounts. With the report for the year recently ended there was submitted a balance sheet which shows cash or securities to the amount of the depreciation and contingencies account so set apart that current assets the company has available for general purposes may be readily distinguished. Mr. Huff says it will be seen that these assets are not more than are necessary for the safe operation of the companies and the protection of the stockholders' interest in the property. He says

> Your directors believe that sufficient cash or its equivalent should be kept available at all time for the purposes of the company, and that the surplus that has been already created should be maintained for the protection of the property. They have, however, paid out in interest on the adjustment bonds, approximately all that has been earned during the last two years, 5 per cent being paid last year and 6 per cent this year.
>
> After the reorganization of the Third Avenue Railway in 1912, 20 per cent of the gross receipts of the companies of the system was set aside for maintenance of the property, depreciation and contingencies. Under the low costs of labor and material prevailing prior to the war, this provided for the maintenance of the property and created a depreciation and contingency fund, which was invested in the securities of the company as follows: $2,022,498 Third Avenue Railway first refunding 4 per cent bonds. $254,388.97 Third Avenue Railway 5 per cent adjustment bonds.
>
> With the high cost of labor and material prevailing during the war and since, it was necessary to increase this percentage of gross receipts for maintenance, depreciation and contingencies from 20 per cent to 25 per cent, and during a portion of the time it required the entire 25 per cent to maintain the property or to take care of deferred maintenance, but there have been

CONSOLIDATED STATEMENT OF INCOME OF THIRD AVENUE RAILWAY SYSTEM FOR YEARS ENDED JUNE 30, 1923 AND 1922

Operating Revenue:	1923	1922
Transportation	$14,008,416	$13,783,349
Advertising	150,000	121,755
Rent of tracks and terminals	26,005	26,868
Rent of buildings and other property	174,695	196,746
Rent of equipment	34,551	....
Sale of power	13,117	12,694
Total operating revenue	$14,406,784	$14,141,412
Operating Expenses:		
Maintenance of way and structures	$1,425,233	$1,667,318
Maintenance of equipment	1,334,189	1,211,766
Depreciation accruals	733,347	597,177
Power supply	1,223,968	1,119,464
Operation of cars	4,574,373	4,492,966
Injuries to persons and property—expended	1,074,590	867,078
Injuries to persons and property—reserved	*203,513	63,890
General and miscellaneous expenses	564,794	535,367
Total operating expenses	$10,726,984	$10,555,026
Net operating revenue	$3,679,800	$3,586,386
Taxes	968,044	964,969
Operating income	$2,711,756	$2,621,417
Interest revenue	287,348	261,537
Gross income	$2,999,104	$2,882,954
Deductions from Gross Income:		
Interest on first mortgage bonds	$548,080	$548,080
Interest on first refunding mortgage bonds	879,620	879,620
Interest on adjustment mortgage bonds	1,126,800	1,126,800
Track and terminal privileges	14,524	14,766
Miscellaneous rent deductions	7,782	9,793
Amortization of debt discount and expense	21,315	20,782
Amortization of limited franchises	10,904	8,670
Sinking fund accruals	33,480	33,480
Miscellaneous	55,324	33,485
Total deductions	$2,697,829	$2,675,479
Net income	$301,275	$207,475

* Deficit.

periods in which a substantial part of the 25 per cent went into the depreciation and contingency account. During the past year, about $750,000 passed into that account, partly due to the fact that it was difficult to secure sufficient labor to carry on the maintenance work, and partly to the fact that it was not believed to be economical to perform under present costs maintenance work that might be deferred to a more favorable time for the purchase of material and employment of labor, and when the money could be expended more economically for maintenance work.

It is important that a depreciation and contingency fund be created and that actual cash or its equivalent be set aside to cover this account, not only because of the necessity for actually purchasing from time to time additional equipment to replace that which has worn out or become obsolete, but because it would seem particularly desirable to have a cash fund available from which to borrow, in order to cover the actual cash expenditures that have to be made under capital account.

So long as accumulated interest on the adjustment bonds remains unpaid, the company is not permitted to acquire or construct additional lines, for which additional capital might have to be issued. It is necessary, however, in order to operate lines already owned or controlled, that from time to time expenditures should be made on account of additions to capital. Under the present conditions, these expenditures must of necessity be taken care of out of the surplus of the companies, or borrowed from its depreciation and contingencies fund.

The increased actual physical property of the companies, upon which they are entitled to increase their capitalization, is an offset against the depreciation of the property that has already taken place, or is to take place, and it is perfectly legitimate to borrow from the depreciation and contingency account, in order to meet the requirements of the capitalization account. It would seem under present conditions that this would be a wise procedure and for the best interests of the security holders of the companies.

At any time that conditions might be favorable, additional securities can be issued for the capital account, and the depreciation and contingency account reimbursed for the funds borrowed from it, while for the present the properties are saved the great sacrifice that would result from an effort to market securities under present conditions.

If the issuance of additional securities can be avoided, with the increase of gross receipts that must result from the growth of the territory of the companies, the financial position of the company should be greatly strengthened, regardless of any temporary setbacks that may come due either to increases in the cost of labor and material, or to the temporary loss of receipts.

Northern Massachusetts May Suspend in December

By a decree of Judge Charles DeCourcy of the Massachusetts Supreme Court, set forth at a hearing in Boston on Nov. 9, service on the Northern Massachusetts Street Railway may cease on Dec. 31 next, either on the whole of the property or upon such portion or portions as the receiver, Daniel P. Abercrombie, shall deem wise, with the written consent of trustees under the mortgages.

The course authorized on the Connecticut Valley system, controlled by the same interests and having the same receiver, was left to be determined at a continued hearing on Nov. 16. The probability is that some of these lines will cease operation on Dec. 31 and that all of them will stop by March 31, unless sales are made enabling some of the lines to be run by other interests.

In the case of the Connecticut Valley lines, which serve Greenfield, Northampton, Deerfield, Turners Falls, Amherst and other points, sale by foreclosure has been generally agreed upon as most desirable. Provisions for immediate needs of the Northern Massachusetts are covered in the court decree, which authorizes the borrowing of $15,000 on receiver's certificates and the renewal of $25,000 in outstanding certificates.

Revaluation of Rochester Lines Sought

The city of Rochester has opened proceedings for the review of the valuation of the Rochester lines of the New York State Railways under the service-at-cost contract with the service of summons and complaint upon the railway. The city sets forth that the valuation of $19,216,000, fixed by the appraisal under the contract, is excessive and predicated upon war-time values.

This action, it is expected, will be tried before the December equity term of the Supreme Court.

President Hamilton of the New York State Railways maintains that the revaluation will show the lines to be worth in excess of the figures set by the appraisal, under which the revenues are now determined.

Purchase of Seattle & Rainier Valley Property Discussed

Possibility of ultimate purchase of the Seattle & Rainier Valley Railway system by the city of Seattle to put Rainier Valley residents on a parity with the rest of the city in fares was discussed informally recently when John C. Higgins, counsel for the company, appeared before the City Council street committee to ask that body to recommend repeal of an ordinance passed recently requiring the company to pave its right of way in Rainier Avenue between Graham and Morgan Streets. The company has pending before the franchise committee of the Council a request for relief from its franchise obligations to pay the city a percentage of its gross revenue as a franchise tax and to carry policemen, firemen and city officials free on its lines. Mr. Higgins said if the company was relieved of these burdens, it would not be able to continue the recent fare adjustment, which put the Rainier Valley patrons on a parity with the Seattle Municipal Railway patrons. While Mr. Higgins suggested that the city might eventually buy the lines as the only means of assuring the same treatment for residents of the section as for other parts of the city, he made it clear that his informal suggestion was not an attempt to open negotiations with the city for merging the line with the Municipal Railway.

Large Payment Made at Montreal on Account of Accumulations

J. F. Saint-Cyr, chairman of the Montreal Tramways Commission, has sent a check for $303,745 to the city, covering city rentals for the quarter ended Oct. 1, amounting to $125,000, the balance to serve against the arrears. This is the first check forwarded covering the present fiscal year payments, the fiscal year of the company being from July 1 to the succeeding June 30. It is with only one exception the highest amount paid on this account since the present contract came into force on Feb. 9, 1918.

Paragraph 4, of Article 92, of this contract, dealing with city rentals, reads as follows:

> The city shall receive out of the gross revenues over and above all other amounts to which it may be entitled under this contract or otherwise the sum of $500,000 per annum during the continuation of this contract, payable quarterly.

During the period from Feb. 9, 1918, to Feb. 12, 1921, the company was unable to pay anything to the city on account of city rentals from its gross revenues, and the quarterly amount of $125,000 consequently grew into a considerable amount of arrears.

On Feb. 12, 1921, the gross revenues were such as to permit the sending of a check to the city for rentals amounting to $61,090. During the succeeding month another check was mailed on the same account, amounting to $170,985.

Four payments were made during 1922, as follows, Jan. 27, to the amount of $182,468; April 27, $195,915; Oct. 3, $260,748; Nov. 27, $318,720.

Four payments have now been made during 1923, as follows: Feb. 12, to the amount of $382,741; May 5, $106,656; August, $81,033; October, $303,745.

Total payments to date under the present contract on account of city rentals amount to $2,064,106. The total amount owing to the city on this account from the beginning of the contract to Oct. 1, 1923, was $2,817,694. The balance still owing to the city is therefore $753,587.

These payments on account of city rentals do not include sums paid to the city by the company for taxes and snow removal. During the fiscal year ended June 30, 1923, the company paid in taxes to the city the sum of $229,629, and in snow removal the sum of $190,800. The latter is half of the total cost of snow removal in the city on the tracks. The amount of $889,151 was paid to the city during the 1922-1923 fiscal year for city rentals, this being 10.86 per cent of the gross revenues.

A Good Year for Aberdeen's Cars and Buses

Despite greater unemployment in Aberdeen, the report of William Forbes, general manager Tramways Department, shows that for the year ended May 31, 1923, the management gave more service and earned more net than in either of the two years preceding. The changes in the railway end compared with the year before were: Gross earnings up from £184,618 to £184,868; operating expenses down from £137,979 to £133,614; net, before interest, sinking fund, depreciation, renewals and special expenditure, up from £46,639 to £51,254; surplus down because of exceptional payments from £15,089 to £8,663. The motor bus division grew from £11,650 gross to £12,557. But operating expenses fell from £8,443 to £8,224, increasing the net before fixed charges from £3,207 to £4,033. After payment of interest, sinking fund and special expenditures, there was left a balance of £1,257 (compared with £771 the year before) for renewal and reserve accounts.

One-third of the railway division's surplus of £8,663 was, by ordinance, turned over to the fund called "Common Good and City Improvements."

The double-deck street cars standard in Aberdeen ran 2,399,742 car-miles for 41,142,504 passengers, giving a density of 17.14 passengers per car-mile. In the preceding year service was less liberal, as only 2,252,889 car-miles were run for 41,087,388 passengers, a density of 18.23 passengers per car-mile. Of course, these high density figures are caused by the zone-fare system. More than 30,238,000 persons rode at 1d. although the fare scale ranges from ¾d. to 3d. As the motor buses are single-deckers and in use on poorer routes, they do not show the same densities, although far higher than American bus routes of like characteristics. The bus routes carried 1,805,279 riders with 169,353 bus-miles, a density of 10.66, which compares as follows with the preceding year 1,646,672 riders, 157,807 bus-miles and 10.43 density.

Street car earnings averaged 18.37d. per car-mile from an average fare of 1.07d. and buses averaged 17.33d. per bus-mile from an average fare of 1.51d. Car operating expenses were 13.36d., leaving 5.12d. to overhead; bus operating expenses were 11.65d. and assigned interest and sinking fund charges 3.93d. per mile.

Ottawa Company Earning 7.74 per Cent Return

Figures on the earnings of Ottawa Electric Railway for the present year have been made public in connection with the negotiations between the company and the city of Ottawa for a straight 5-cent fare and extensions to the company's system. According to the *Canadian Financial Post* the figures indicate that for the first eight months of the present year the gross passenger revenue declined $40,069, as compared with the first eight months of 1922.

The compilation of the return on the company's plant investment indicates a yield of 7.74 per cent during 1922 obtained as follows:

Capital additions	$88,730.43
Allowance for engineering, etc.	9,760.34
Total annual additions	$98,490.77
Total investment at end of period	4,076,499.47
Less one-half capital additions	49,245.38
Average investment	$4,027,204.09
Working capital	80,000.00
Average investment and working capital	$4,107,204.09
Net return available 1922	317,826.01
Per cent return 1922,	7.74

Income Lower—Passengers Increase in Louisville

During the nine months ended Sept. 30, 1923, the number of passengers carried on the Louisville Railway totaled 73,102,434. This represented an increase of nearly 5,000,000 over the corresponding period in 1922. The revenue derived from these patrons, however, was not so great as last year, due to a fare rate reduction through the sale of 6-cent tokens used by about 80 per cent of the passengers carried. The total revenue from transportation was $3,182,417, a decrease of $135,834 compared with the same period of last year. The decrease in operating revenue was offset by operating economies effected, which resulted in reduction of expenses for the nine months of 1923 by $46,416. Operation of all these factors has resulted for the first nine months of this year in a reduction of the barometer fund from $350,000 to $238,571, after the payment of all expenses, fixed charges and full accrual of dividends, as provided by the ordinance. It is expected that October operations will further reduce the amount of the fund by $10,000, according to a statement by President Barnes. He further stated that if the barometer fund could, by operating economy and by increased riding, be brought to the sum of $500,000, the fare would under the terms of the ordinance be reduced to 6 cents straight.

Long-Term Bonds Offered.—A syndicate headed by E. H. Rollins & Sons is offering at 98½ and interest to yield more than 6.10 per cent, $5,000,000 of the Illinois Power & Light Corporation first and refunding mortgage gold bonds, known as series "A," 6 per cent, thirty years. The bonds are dated April 2, 1923, and are due April 1, 1953. The bonds are secured by direct mortgage or collateral lien on properties appraised at a value substantially in excess of the total debt and are a direct first mortage or lien free of prior encumbrance on properties, including some of the most important power and light properties of the system.

New Director Elected.—Irving T. Bush has been elected a director of the Brooklyn City Railroad to fill a vacancy.

Property Sold.—The property of the Northwestern Electric Service Company, which operates a trolley and lighting service between Erie and Meadville, was recently sold to the Penn Public Service Corporation of Johnstown, Pa. Last May the Penn Public Service Corporation, acquired the stock of the Erie Lighting Company and the acquisition of the Northwestern stock is part of a far-reaching plan on the part of the Penn company to extend its power and lighting properties throughout the state of Pennsylvania from the Maryland line in the south to Erie in the north. Purchase of the Northwestern Electric stock was made through the Venango Public Service Corporation.

Five-Year Gold Notes Offered.—The Salt Lake & Utah Railroad has announced the offering of a new issue of $150,000 of five-year 7 per cent secured gold notes. The issue has been purchased by the Palmer Bond & Mortgage Company and E. H. Rollins & Sons. The notes, offered at 99 and interest to yield 7¼ per cent, are secured by deposit with a trustee of $200,000 of Salt Lake & Utah Railroad's 6 per cent first mortgage bonds. A feature of the notes is that they are convertible into first mortgage bonds prior to Oct. 1, 1925, at 89; thereafter the conversion price advances 1 per cent each year until maturity of the notes, Oct. 1, 1928. The proceeds of the notes are to be used by the railroad to cover the cost of additions and improvements along its line, chief among which are tracks and sidings at the new Columbia Steel Corporation's plant near Provo, Utah.

Payment Made.—The May 1, 1923, coupons pertaining to the Dayton, Springfield & Urbana Electric Railway's first mortgage 5 per cent thirty-year gold bonds due Nov. 1, 1928, were paid Nov. 1 last at their face amount, together with six per cent interest.

Traffic and Transportation

Ten-Cent Fare Justified

Report of Engineers Confirms President's Statement that Davenport Company Must Have Relief

That the relief plan recently proposed to the City Council of Davenport by President B. J. Denman of the Tri-City Railway of Iowa is justified, including a 10-cent fare and a drastic rerouting plan, is the finding of an audit filed with the city on Nov. 8 by Burns & McDonnell, engineers.

The report bears out the arguments submitted by Mr. Denman when he told the City Council that unless some financial relief was granted his company it would be forced to discontinue transportation service. The engineers find the company is entitled to a 10-cent fare; that track abandonment and rerouting as demanded by the company are justified; that the company cannot take care of the depreciation of its property and pay a proper return under the present rates and operating expenses, and that charges made to operating cost are more than fair, the United Light & Railways Company, the holding concern, having been of decided service to the local company.

The investigator for Burns & McDonnell was R. L. Baldwin. Present valuation of the company's property in Davenport is $3,257,519, this figure being as of Aug. 31 last. The auditor's report substantiated figures used by Mr. Denman in his relief demands, he having used approximately the same valuation figure; in fact, basing his figure not on the company's own valuation estimate but on an extension of a previous valuation figure arrived at by Burns & McDonnell when employed by the city of Davenport in 1920.

The total revenue for the twelve months ended Aug. 31 was $754,106 and for 1922 $752,415. Operating expenses for the twelve months ended Aug. 31, 1923, are $600,603 and for 1922 $602,581.

The report allows the company 3½ per cent for depreciation and 7 per cent for return on investment. This year the company has made only 4.72 per cent, according to the report. Last year it made 4.70 per cent. In 1917 a 7.70 per cent return is indicated. Since then the company has been unable to make both ends meet.

One-Man Cars Under Fire

Agitation has been renewed against the use of the one-man car in Massachusetts. Employees are circulating petitions which have for their purpose the doing away with these cars. If present indications are any criterion the prospect is that the question of the continued use of these vehicles will be a matter for legislation at the coming session. The legislation asked in the petitions now being circulated provides that one-man cars shall be forbidden, and that communities where they are operated may vote whether to apply the law to themselves. Platform men everywhere are making a talking point of the fact that the Public Utilities Commission overruled the efforts of the City Councils of Worcester, Cambridge and some other towns and cities to eliminate one-man cars.

Asked for an expression of opinion on the matter Clark V. Wood, president of the Springfield Street Railway, is reported to have said:

> The public may have to choose between one-man cars and no service, and the trolleymen may find they have killed the goose that lays their golden egg. If the companies cannot carry the costs of two-man cars, and are forbidden by law to operate one-man cars, there may not be any trolley jobs at all for the men.
>
> You cannot legislate against economic laws. On many lines the introduction of one-man cars enabled service to be maintained, when the costs of operation had endangered the continuance of service.

Posts Abolished in District of Columbia

Fixed posts to guard street car safety zones in the District of Columbia have been abolished by order of the Public Utilities Commission on the ground that they constitute a menace to vehicular traffic.

Four sets of these posts were installed in the business district of Washington as an experiment, two being on lines of the Washington Railway & Electric Company and two on lines of the Capital Traction Company. The system consisted of iron posts imbedded 2 ft. in concrete and standing 4 ft. above the street level, set 25 ft. apart to mark a street car loading station and protect passengers. The posts were painted white, with black stripes, for visibility and were marked by oil lanterns with red globes at night. They were removable so that the streets might be cleared for parades and similar uses.

A series of accidents resulting from motorists driving into the posts, mostly at night, caused public attention to be centered upon the experiment, which was tried for an experimental period at the direction of the Public Utilities Commission.

The order of the Utilities Commission directing removal of the posts, for which painted lines have been substituted, brought a protest from the Capital Traction Company on the ground that no hearing on the subject had been granted. The letter called attention to the fact that while removal of the posts might benefit motorists it left passengers exposed to the hazards of street traffic while attempting to board or leave cars.

2,700,000,000 Passengers a Year

456 Rides per Person per Year Is the Record in New York—Surface Lines Carry 40 per Cent

Nearly 2,700,000,000 revenue passengers were carried last year upon the surface, subway and elevated lines of New York City. This traffic was divided almost exactly, 60 per cent to the rapid transit groups—elevated and subway lines—and 40 per cent to the surface lines. The total traffic, 2,681,206,755, represents an increase of 90,893,027 passengers over 1922, each fare that was paid being computed as a passenger carried.

The rate of growth in the fiscal year 1923, however, was slightly less than last year, when nearly 8,000,000 more passengers were carried. The percentage of growth in 1923 was 3.51 per cent, as against 3.95 per cent in 1922. Whereas last year more than three-quarters of the increase was upon the surface lines, in the fiscal year 1923 the condition was almost exactly reversed, the rapid transit line increase being 72,122,104, as against 23,919,193 upon the surface lines.

The figures just quoted were compiled by the New York Transit Commission. They cover the fiscal year ended June 30 last. While the returns have not yet been fully checked, awaiting the final compilation of the figures from the annual reports of the companies, the ultimate figures will not show a variation of more than a few thousand passengers, at most, from the present calculations. The traffic upon steam railroad and omnibus lines is not included.

While the general traffic increase for the year was 3.51 per cent, the traffic has increased more than 30 per cent since the fiscal year 1919, in which year the 2,000,000,000 mark was passed for the first time. A part of the increase in traffic was due to the increase in the habit of riding by New Yorkers. To-day the average New Yorker takes ten times as many rides in a year as he did in 1860. In the latter year, the first of which there is any competent record, the average number of rides was 43. In 1923, based upon an estimated population of 5,875,996, each New Yorker rode 456 times. He rode 448 times in 1922 and 437 times in 1921.

Both the increase in the riding habit and the gross increase in the traffic are indicative of the need for new facilities as fast as they can be provided. Twenty years ago, a year before the first subway was opened, the billion mark in street railroad traffic was passed for the first time. Three years later traffic had grown 25 per cent, to a billion and a quarter. In the seventeen years since, the traffic has more than doubled. While rapid transit facilities have increased in capacity in that period by the building of new subways and the extending and third-tracking of the elevated railroads, the surface car track mileage

STREET RAILWAY TRAFFIC IN NEW YORK CITY, 1921-1923

Number of Revenue Passengers (Cash Fares)

	Fiscal Year Ending June 30			Increase* of 1923 over 1922
Subway and Elevated Lines:	1921	1922	1923	
Interborough—				
Subway	639,385,780	644,975,474	676,650,431	31,674,957
Elevated	374,293,051	348,517,216	348,524,700	7,484
B.R.T. elevated and subway	404,970,640	444,747,228	480,900,869	36,153,641
Hudson and Manhattan tubes	95,607,645	99,104,889	103,390,911	4,286,022
Total rapid transit	1,514,257,116	1,537,344,807	1,609,466,911	72,122,104
Street Surface Lines:				
By Boroughs—				
Manhattan	384,128,024	388,357,767	383,209,497	D5,148,270
Brooklyn	418,106,693	472,538,068	490,128,692	17,590,624
The Bronx	107,675,507	114,679,520	119,140,781	4,461,261
Queens (*a*)	51,944,034	58,826,451	59,852,694	1,826,243
Richmond	15,797,894	18,567,115	19,408,180	841,065
Total surface lines	977,652,062	1,052,968,921	1,071,739,844	23,919,193
Grand total	2,491,909,178	2,590,313,720	2,601,206,755	90,693,027
Population (*b*)	5,705,364	5,780,870	5,875,996	....
Fares per capita	437	448	456	....

(*a*) Exclusive of B.M.T. (*b*) Estimated on basis of one-tenth of decennial increase.
* Prefix D indicates decrease.

has tended to decrease steadily. As the commission has repeatedly pointed out, more rapid transit lines are urgently needed if adequate provision is to be made for the growth in traffic. With the growth in traffic has grown the length of ride, the latter being to a certain extent responsible for the former. Where people used to walk they now ride, because in most instances it is no longer possible to walk the distance between work and home. As the commission sees it surface cars and bus lines, while playing a highly important part in short-haul transportation and in feeder traffic, are becoming less and less a factor in the solution of the long-haul transportation problem.

The traffic upon the Hudson & Manhattan tubes, while largely a traffic into and out of New York rather than a traffic within the city, is nevertheless included in the gross figures. The following table shows the traffic of all the lines,—subway, elevated and surface,—operated in certain years, with the increases in each year, including figures of the Hudson tubes for the years in which those lines have been operated:

Year Ended June 30	Number of Revenue Passengers	Annual Increase
1903	1,000,767,483	61,777,519
1906	1,251,841,173	120,838,479
1910	1,531,262,914	128,845,272
1913	1,709,876,508	88,962,573
1916	1,898,735,615	91,102,889
1918	1,975,482,316	56,670,087
1919	2,079,944,297	104,461,981
1920	2,365,587,369	285,643,072
1921	2,491,909,178	126,321,809
1922	2,590,313,728	98,404,550
1923	2,681,206,755	90,893,027

One of the outstanding features in the traffic statistics of the year was the fact that the tremendous traffic loss was halted which began on the Manhattan elevated lines of the Interborough Company in 1921, and these lines showed a very slight gain, amounting to 7,484 passengers over last year. The total Interborough elevated figure, however, is still far below the 1921 figure, 1922 having shown a falling off of more than 25,750,000 elevated passengers from the previous year. In 1921 the Manhattan elevated carried about 374,500,000 passengers, while last year and this year the figure was about 348,500,000, the exact figure for this year being 348,524,700. The change in regard to the Interborough elevated traffic is generally presumed to be due to the campaign which that company made to build up this traffic, resulting in increased service and in the repainting of cars and stations a taxicab orange. The statistics show that just about the time this campaign started the loss in traffic which had been continuing into the current fiscal year, was halted, and there was a prompt gain.

Still another feature of the traffic year was the increase in riding upon the Interborough subway. During the fiscal year 1922 the gain upon the Interborough's underground system was only a little more than 5,500,000 passengers, losses being noted upon practically all parts of the system except upon the two main trunk lines through Manhattan. This year, however, the Interborough subway traffic was 676,650,431, a gain of 31,674,957. The Interborough traffic, therefore, was more than the whole traffic upon all lines in the city of New York thirty years ago.

Another outstanding feature of the report for the year was a falling off in trolley traffic in Manhattan of 5,148,270, as against a gain last year of 4,229,743. The exact cause of this change is not determinable, but it is probable that the elevated railroad traffic campaign drew a large number of riders from the surface cars, as with the growth of vehicular traffic in the street, the difficulty of maintaining trolley schedules is constantly increasing. The loss, however, in trolley traffic in Manhattan is a small figure when compared with the aggregate of this traffic, and does not mean any material falling off, being in fact larger than in any other recent years outside of 1921 and 1922, and higher than in any other period in the history of such railroad operation in Manhattan, with the exception of the four years 1913 to 1916, inclusive, which were the banner years of trolley operation in Manhattan, the figure of total traffic being for each of the four years well over 400,000,000.

The Brooklyn trolley gain for the year was 17,590,624 in a total traffic of 490,128,692. The figure of gain for the year previous, however, nearly 54,500,000, was abnormal, due to the splitting up of lines and the collection of added fares thereby, together with an abnormally low traffic, due to street car strikes in a part of the previous fiscal year. The Bronx, with a gain of 4,461,261 in a total trolley traffic of 119,140,781, shows a somewhat reduced rate of gain from the previous year. For the Borough of Queens, in a total trolley traffic of 59,852,694, there was shown a gain of 1,026,243, which was also less than last year, but appreciable. Trolley traffic in Richmond Borough, which showed a rather abnormal growth last year, in 1923 went back to its practically normal rate, with an increase of 841,065 in a total traffic of 19,408,180. The total traffic upon the rapid transit lines was 1,609,466,911, and on the surface railroad lines 1,071,759,844.

Estimated upon the basis of 340 average traffic days in the year,—account being taken of lighter traffic on holidays and Sundays,—the total increase in 1923 would mean that 267,000 more persons each day rode upon the subways, elevated and surface car lines of the city than rode upon a similar date in the year previous. As a matter of fact, however, the rate of increase is known to be far higher at the end of the year than at the beginning, and it has been estimated that about 2,500 more persons ride upon these lines on a particular day than rode upon the day previous. Using the same divisor of 340, the daily total traffic averaged last year 7,885,900 passengers; but again taking into consideration the fact that traffic is higher at the end of the year than at the beginning, the figure was probably well over 8,000,000 at the end of the fiscal year.

Despite the slight net gain for the whole Interborough elevated system, there was a net loss of traffic upon two of its principal lines, the Third Avenue and Sixth Avenue. However, where last year the loss upon the Third Avenue line was nearly 8,000,000, the drop this year was less than 150,000. On the Sixth Avenue line last year, which suffered a loss of 10,750,000 in traffic, the loss this year was about 1,100,000. The Second Avenue and Ninth Avenue lines which, together, last year lost 7,000,000 passengers, this year both showed a gain amounting to more than 1,250,000 passengers. On the Interborough's underground system, passengers carried on the Lexington Avenue trunk line were 202,600,000 in number, or 8,400,000 more than last year, while on the West Side trunk line, with 199,600,000 passengers, there was a gain of 12,200,000. With the exception of the West Farms branch, which lost about 400,000 passengers, and the stations in downtown Brooklyn, which dropped back about 275,000, practically all branches of the Interborough subway system showed gains. There was a gain of 5,000,000 passengers on the Jerome Avenue branch; of 2,500,000 on the Eastern Parkway branch, and of 1,600,000 on the Queensboro subway.

The Broadway subway of the B.-M. T.

system continued to be one of the great traffic gainers. Last year it had a traffic of a little less than 109,000,000, and this year of 119,000,000, a gain of nearly 10,200,000. Other lines in the Brooklyn system which showed big gains were the Brighton and Fourth Avenue subway lines and the Lexington Avenue elevated, which each gained about 3,000,000 passengers; the Fulton Avenue elevated, which gained some 2,500,000 passengers; the West End line, with 2,000,000 passengers; the Culver, Sea Beach and Myrtle Avenue lines, with 1,000,000 passengers each, and the Canarsie and Fifth Avenue elevated lines, with 500,000 each.

The accompanying table shows the street railway traffic in New York for the three years 1921 to 1923, inclusive.

Ordinances Introduced to Prohibit Jitneys in Gadsden

An ordinance has been introduced before the City Council of Gadsden, Ala., designed to put the jitneys out of business. The ordinance prohibits the operation of the jitneys on streets over which electric railway cars are operated. If the jitneys cannot be operated over streets where car lines run the jitneys will be forced out of business. This ordinance will come up before the City Council for final passage on Dec. 1. Officials of the Alabama Power Company, which operates in Gadsden say the buses and the jitneys are getting so much of their business that the operation of the cars is unprofitable.

Alabama City and Attalla, two good-sized towns, are located within a few miles of Gadsden. These two towns are connected with Gadsden by street cars, buses and jitneys. Officials of both Attalla and Alabama City are discussing the probability of passing ordinances similar to the one now before the City Council of Gadsden. Should these ordinances be adopted it would prevent the operation of buses and jitneys on the paved highways entering these three cities.

Different Rates Sought in Pensacola

Jack G. Holtzclaw, receiver for the Pensacola Electric Company, has filed a petition with the Florida Railroad Commission asking for a readjustment of passenger and freight rates. The petition leaves the rate entirely to the commission to decide. In the petition Mr. Holtzclaw says that the railway loses on an average of $55 a year in fares on every privately owned automobile in its territory.

Vote Against One-Man Cars.—At a recent election in Dayton the people voted in favor of an ordinance requiring two men on every car. The Oakwood Street Railway, the Peoples Railway and the Dayton Street Railway have been running one-man cars.

Why the Trackless Trolley?

The trackless trolley is said to have made a hit. But why not the bus without the trolley poles and overhead wires?—Philadelphia "Evening Bulletin."

The trackless trolley is primarily the forerunner of extended trolley service and, by utilizing the electrical distribution system, can be operated by means of street car motors at a cost sufficiently lower than that of the gasoline motorbus of similar size closely to approximate the difference between the trackless trolley fare of 7 cents—four tickets for 25 cents—and the 10-cent fare which is necessary to support operation of the gasoline motorbus when supplying similar service.

—Philadelphia Rapid Transit Co.

Will Supplement Service with Buses.—Service given by the Jacksonville Traction Company will be supplemented by buses, according to a recent announcement of J. P. Ingle, general manager of the company. It is planned to replace the line on Oakland Street with buses as a start, and if this service proves successful similar service will be established in other sections not now served by the railway. For sometime the city has been seeking the extension of the railway line to the electric light plant and municipal docks, but the necessary cost would be prohibitive, according to Mr. Ingle. The regular 7-cent fare now in effect on the railway line will prevail on the buses and transfer privileges will remain as at present.

Winter Rates in Effect.—Winter rates on the Oregon Electric Railway, operating between Portland, Ore., and Willamette Valley points, became effective Nov. 12. Under the new tariff, which affects week-end and fifteen-day round trip tickets, the fare from Salem to Portland will be increased from $2 to $2.30, the fifteen-day ticket from $2 to $2.50, the week-end fare, Eugene to Portland, $5.30 instead of $4.90, and the fifteen-day rate $6 instead of $5.80.

No Jitneys in El Paso.—Following the opinion of Judge Stewart Berkshire of the Corporation Court declaring the jitney ordinance invalid because it did not specify both a maximum and minimum penalty for violation, the City Council under the emergency clause passed a new ordinance at the same time repealing the older one. After this ruling jitneys ceased to run. One jitney driver did operate but was arrested and fined. His case is now on appeal in the higher court. With this exception no jitneys have been run in El Paso since April 30 of this year. This brings up to date the status of the jitney situation, which was referred to in the ELECTRIC RAILWAY JOURNAL, issue of Oct. 20, 1923, page 723.

Improved Service Provided.—J. M. Barry, division manager of the Alabama Power Company, recently submitted to Mayor Gunter of Montgomery a proposal for the rerouting of the Montgomery Street Railway system. The proposal includes transfer privileges between depot cars and other cars so that passengers could travel on the cars between the Union Station and all other parts of the city.

Will Consider Results of Referendum.—A post card referendum is to be started in Milwaukee. Post cards on the desirability of continuing motor bus service in the Eighteenth Ward will be sent to all owners of property on the streets where the buses of the Milwaukee Electric Railway & Light Company are operated. The results of the referendum will be placed before the Common Council for consideration.

Anti-Jitney Ordinance Before Court.—The case of E. C. Waid against the city of Fort Worth, Tex., on appeal before the Court of Civil Appeals, involving the validity of the anti-jitney ordinance enacted by the city of Fort Worth has been set for hearing before the court. This particular ordinance as passed makes it unlawful for jitneys and other vehicles carrying passengers for hire in opposition to the traction company to operate on certain specified streets, the specified streets being the downtown business district. Enforcement of the ordinance would put the jitneys in Fort Worth out of business.

Fare Reduction Sought.—A reduction in fares at Savannah, Ga., to 5 cents is being sought by the city. A resolution asking for the reduction has been adopted by the City Council, and the Mayor of Savannah will present it to officials of the Savannah Electric & Power Company. The present rate is 7 cents. If the company refuses voluntarily to grant the request, the resolution authorizes the Mayor of Savannah to appeal the matter to the Georgia Public Service Commission.

Hears Five-Cent Fare Claim.—The city of London, Ont., has questioned the right of the London Street Railway to charge the 5-cent fare that is now in effect. R. G. Ivey, vice-president of the company, recently appeared before the Provincial Cabinet to present the claim of his company. Adam Back and City Solicitor Meredith appeared before the Cabinet on behalf of the city.

More One-Man Cars in Use in New Jersey.—As a measure of economy the Public Service Railway, Newark, N. J., is extending the use of its one-man cars. In the Central division of the system one-man cars have been placed in operation on the Middlesex and South Amboy lines. Other lines which tried out the one-man type of cars recently were the West Hoboken line operating in Hoboken and West Hoboken; Pavonia line, in Jersey City, and the Clifton line, in Newark. The Bergen line in Newark has been using the one-man cars for several months.

Personal Items

G. E. Departments Combine

Publication and Advertising Departments to Merge on Dec. 1 with M. P. Rice as Manager

The publication and advertising departments of the General Electric Company will be combined on Dec. 1, with Martin P. Rice, as manager of the publicity department, in charge.

Frank H. Gale, advertising manager, will on Dec. 1 become assistant to D. R. Bullen and manager of conventions and exhibits. Mr. Bullen was recently appointed assistant vice-president, and Mr. Gale will do important association work.

C. H. Lang, who has been assistant to Mr. Rice as manager of the publication department, will continue as assistant manager of the newly created publicity department, and T. J. McManis, who has been manager of the department of publicity for the Edison Lamp Works of the General Electric Company at Harrison, N. J., will also become an assistant manager of the new department.

In addition to the above announcement made by President Gerard Swope, an advertising council has been created, with the following members and with Director B. G. Tremaine, Vice-presidents J. R. Lovejoy, George F. Morrison and F. S. Terry and A. D. Page as ex officio members of this council: Chairman of the council, J. G. Barry; manager of publicity department, M. P. Rice; assistant manager of the publicity department, T. J. McManis; P. B. Zimmerman, George C. Osborne, L. P. Sawyer and G. P. Baldwin; advertising counsel, Bruce Barton, and secretary of the council, C. H. Lang.

Mr. Rice, the new publicity manager, has been in the employ of the General Electric Company for twenty-eight years. He was graduated from the University of Pennsylvania in the class of 1893 with the degree of bachelor of science, and then took a post-graduate course, receiving the degree of mechanical engineer.

Mr. Rice entered the service of the General Electric Company in 1895 in the drafting room. After nine months he was transferred to the engineering department, and when the X-ray was discovered was assigned to that new work. The publication bureau was organized in December, 1897, and he was made manager, a position he has since held. In this position he had supervision of all company printing, photographs, technical data and all general publicity for the company. In June, 1903, he established the *General Electric Review*.

In February, 1921, when the General Electric Company became interested in radio broadcasting, Mr. Rice was made director of radio broadcasting and in this position outlines the company's policy in this new field. He readily recognized that broadcasting should be more than a mere entertainment to be successful and that its programs should be educational and helpful to the public in the distribution of interesting news events of the day. The company is now building a second large radio station at Oakland, Cal., and has definitely announced plans for a third station to be built at Denver, Col., both of which will come under Mr. Rice's supervision.

Mr. Gale has been in charge of the space advertising of the company for the last seventeen years. As a member of the staff of Dana R. Bullen, assistant vice-president, he will assist Mr. Bullen in the manifold activities of his new work, and in particular will have charge of conventions and exhibits. He will have the title of manager of conventions and exhibits, and his field will be one with which his work has made him very familiar.

M. P. Rice

Mr. Gale entered the service of the Thomson - Houston Electric Company at Lynn, Mass., in 1890 as a draftsman. Later he served in the catalog department. With the formation of the General Electric Company in 1892, into which the Thomson-Houston Company was merged, his work took him to Schenectady, to the Schuyler plant at Middletown, Conn., to the Edison Lamp Works at Harrison, N. J., and to the Brush Works at Cleveland, Ohio, where he was also associated with the Short Electric Railway and the Sperry Electric Railway.

He returned to Schenectady in the spring of 1895, and in 1899 was transferred to the commercial department. In 1901 he had charge of the company's interests at the Pan-American Exposition at Buffalo, and since then has had supervision of such work at all exhibits and conventions, notably at the St. Louis and San Francisco world's fairs. He was awarded a gold medal at the San Francisco Exposition for the excellence of the design of the company's exhibit. Following the St. Louis Exposition he was placed in charge of the company's advertising in periodicals and later given the title of advertising manager.

A. V. Kipp, traffic manager of the Salt Lake & Utah Railroad, has been appointed assistant general freight agent of the Oregon Short Line. Mr. Kipp has been traffic manager of the Salt Lake & Utah Railroad since March 1, 1921. For six months prior he served as general freight and passenger agent for the road. He has been constantly connected with railroads of the West since he entered the service of the Union Pacific at Omaha in 1902 as telegraph operator. He consecutively became chief operator at the Omaha office, traffic agent for shipments in Wyoming, traveling freight agent with headquarters in Denver and contracting freight agent for Denver. During the war he had charge of the traffic department of the United States food administration for Colorado. Mr. Kipp's successor as traffic manager has not yet been named.

Don. C. Farra, for twelve years connected with the freight department of the Boston & Maine Railroad, has been appointed freight agent of the Springfield Terminal Railway Corporation, Springfield, Vt., owing to heavy freight movements over the Springfield-Charlestown, N. H., electric line.

Edward M. Raver has been appointed claim agent of the Chicago and West Towns Railway at Oak Park, Ill. For the past seven years he has served as supervisor of claims for the northern district of California, with the Union Automobile Insurance Company at San Francisco. He has been connected with the Fort Wayne & Northern Indiana Traction Company and as superintendent of transportation with the Michigan United Railways at Jackson and Battle Creek. For three years beginning in 1913 he was superintendent of transportation and claim agent with the Lincoln Traction Company of Lincoln, Neb.

Obituary

Edwin W. Olds, once prominent in the electric railway field, died recently in Long Beach, Cal., at the age of seventy-six. Early in 1911 Mr. Olds resigned as superintendent of rolling stock of the Milwaukee Electric Railway & Light Company and with that resignation severed his connection with the electric railway industry. He entered the service of the Milwaukee company in 1896. He was one of the organizers of the American Elecric Railway Engineering Association and had always been prominent in the councils of that body. He served as president of the association in 1903-04.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Fewer Electric Railway Repair Shops Employ More Men

The reduction in the number of electric railway car repair shops in the United States is an outstanding feature of a report recently published by the Department of Commerce. Whereas there were in 1919 some 624 such repair shops, there were only 560 two years later. In spite of the reduction in the number of shops, however, the number of workmen employed increased from 33,120 to 35,638. Their wages increased from about $39,000,000 in 1919 to more than $47,000,000 in 1921. The number of salaried employees, as shown in the table below, increased more than did the number of wage earners. In 1921 such employees numbered 2,359, as compared with only 1,847 in 1919.

This report shows also the distribution of the shops by states. Pennsylvania leads in the number of electric railway car repair shops with 70, Ohio is second with 65 and New York is third with 45. Illinois, with 42, is not far behind. In number of employees, however, New York is first with 5,799, Pennsylvania is second with 4,458 and Illinois third with 4,021. Ohio, which ranks second in number of establishments, ranks below California in number of employees. Wages have followed the same general trend as the number of employees, although Illinois, with fewer employees than Pennsylvania, nevertheless pays a considerably larger sum in wages.

State	No. of Establishments	Total Persons Employed	No. Salaried Employees	Wage Earners, Average Number	Salaries	Wages	Paid for Contract Work	Cost of Materials	Value of Products
United States:									
1921	560	35,638	2,359	33,279	$4,461,800	$47,775,235	$105,862	$33,560,133	$87,312,426
1919	624	33,120	1,847	31,272	2,979,367	39,073,154	118,335	32,025,484	75,210,701
1914	649	28,215	1,827	26,384	1,914,538	18,644,845	24,596	17,609,574	38,576,565
Alabama	7	205	10	195	23,963	279,793	....	256,705	560,461
California	22	2,602	118	2,484	218,434	3,977,151	8,124	2,217,467	6,426,872
Colorado	5	272	17	255	20,498	395,147	3,675	226,258	645,579
Connecticut	17	722	93	629	199,520	578,154	....	722,156	1,502,227
Georgia	8	343	19	324	36,313	258,770	....	231,573	526,657
Illinois	42	4,021	253	3,768	536,154	5,694,974	2,082	3,737,988	9,975,845
Indiana	29	1,180	113	1,067	148,418	1,318,309	....	889,252	2,393,856
Iowa	14	232	17	215	36,422	294,900	28,141	294,771	654,236
Kansas	10	162	17	145	29,852	204,914	....	176,737	411,505
Kentucky	6	223	10	213	20,272	281,272	....	134,793	450,183
Louisiana	7	438	36	402	81,500	703,715	11,398	541,980	1,340,049
Maine	10	184	14	170	24,925	218,104	637	217,788	462,740
Maryland	5	926	44	882	38,976	891,573	....	453,204	1,383,753
Massachusetts	30	1,704	87	1,617	123,226	2,378,630	....	1,493,302	4,072,298
Michigan	17	1,532	115	1,417	450,398	1,848,732	....	1,896,934	4,252,511
Minnesota	7	621	43	578	111,579	937,433	....	567,621	1,617,645
Mississippi	5	31	8	23	14,351	26,710	....	60,436	101,497
Missouri	8	1,216	62	1,154	114,390	1,828,173	....	1,574,774	3,517,337
Montana	4	36	3	33	7,764	52,952	....	30,722	91,438
N. Hampshire	5	78	4	74	7,569	126,201	1,000	49,877	184,985
New Jersey	14	1,455	37	1,418	91,634	2,270,570	....	1,966,685	4,328,891
New York	45	5,799	394	5,405	687,451	9,532,574	11,644	4,978,183	15,344,539
North Carolina	7	76	15	61	16,550	75,858	....	61,346	154,355
Ohio	55	2,340	108	2,232	202,978	2,158,521	23,343	1,731,569	5,170,617
Oklahoma	9	184	22	162	41,989	220,475	....	152,302	414,766
Pennsylvania	70	4,458	277	4,181	518,053	5,292,840	10,427	4,469,201	10,294,786
Tennessee	6	300	6	294	15,600	428,253	....	274,985	721,027
Texas	16	726	52	674	104,952	853,409	108	497,679	1,456,895
Utah	3	171	12	159	10,851	230,860	....	152,248	396,021
Vermont	4	27	2	25	2,626	30,809	....	21,066	54,501
Virginia	9	400	28	372	36,359	371,713	....	394,812	802,939
Washington	11	1,077	174	903	194,555	1,464,395	796	793,442	2,453,188
West Virginia	10	189	14	175	22,172	231,661	....	196,892	450,740
Wisconsin	14	604	71	533	141,723	769,115	2,737	785,914	1,700,753
All others*	29	1,104	64	1,040	129,783	1,548,575	1,750	1,309,471	2,996,734

* Arizona, 2 establishments; Arkansas, 2; Delaware, 1; District of Columbia, 2; Florida, 5; Idaho, 2; Nebraska, 2; Nevada, 1; North Dakota, 2; Oregon, 3; Rhode Island, 4; South Carolina, 1; South Dakota, 1; Wyoming, 1.

American Couplers Going Abroad

During recent months the Ohio Brass Company has received a number of orders for Tomlinson standard automatic couplers for use in foreign countries. Cia. Metropolitano Alfonzo XIII, Madrid, Spain (the subway of Madrid), has purchased eighty-four coupler equipments. Companies in Australia have purchased coupler equipments for 150 cars. Both of these orders call for couplers comprising automatic electrical coupling as well. The railway in Haarlem, Holland, recently bought couplers for seventy-five cars, and 200 coupler equipments were ordered from Rio de Janeiro. Japanese companies have ordered 120 couplers.

Brill Buys Service Motors

The J. G. Brill Company, Philadelphia, has purchased the railroad motor coach division of the Service Motors, Inc., Wabash, Ind., with exclusive rights for the production and sale of the type of gasoline driven rail cars heretofore known as the Service Model 55 railroad motor coach. While the Brill Company has heretofore furnished only the bodies for these cars, it will now furnish the complete unit without change in design. With its extensive facilities the company will be better able to meet the increased demand for this type of equipment. In the future this type car will be known as the Brill Model 55 gasoline car.

Cars of this type have been operated for more than 1,500,000 miles in the United States. Twelve similar cars are now being built for the Australian Government Railroad. They are about 44 ft. long and weigh in the neighborhood of 28,000 lb. The renewal part business for the cars now in service and the guarantees given by Service Motors, Inc., have been taken over by Brill.

The purchase gives the Brill Company a complete line of automotive cars for steam railroads ranging from the thirty-passenger, six-wheel type to the Model 55 with a maximum capacity of fifty-five passengers. This part of the business is handled by the automotive car division, with C. O. Guernsey, designer of the Model 55 and formerly vice-president of Service Motors, as chief engineer. C. J. McPherson, A. H. Hudson and A. F. McCormick, all formerly of Service Motors, have joined the Brill organization to assist in this work.

Dayton Air Brush Company to Be Sold

The assets of the Dayton Air Brush Company will be offered for sale at the Montgomery County Court House, Montgomery County, Ohio, on Nov. 24. They will be sold at such prices as may be approved by the court. The assets consist of patents, good will, accounts receivable, and a small amount of equipment and parts. The order for the sale was given by Judge Robert C. Patterson of the Common Pleas Court of Montgomery County, Ohio.

Metal, Coal and Material Prices

Metals—New York	Nov. 13, 1923
Copper, electrolytic, cents per lb	13.375
Copper wire base, cents per lb	16.00
Lead, cents per lb	6.875
Zinc, cents per lb	6.425
Tin, Straits, cents per lb	44.50
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.30
Somerset mine run, Boston, net tons	2.375
Pittsburgh mine run, Pittsburgh, net tons	1.925
Franklin, Ill., screenings, Chicago, net tons	1.45
Central, Ill., screenings, Chicago, net tons	1.05
Kansas screenings, Kansas City, net tons	2.25
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	$6.50
Weatherproof wire base, N. Y., cents per lb	16.50
Cement, Chicago, net prices, without bags	2.50
Linseed oil (5-bbl. lots), N. Y., per gal	0.93
White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots	11.25
Turpentine, (bbl. lots), N. Y., per gal	0.97

Directors Declare Dividend

The board of directors of the Pressed Steel Car Company, Pittsburgh, met on Nov. 8 and declared the regular dividend of $1.75 per share on the preferred capital stock and a dividend of $1 per share on the common capital stock. No announcement was made, however, concerning the volume of business done nor the earnings. It is expected that this information will be contained, however, in the annual report which will be issued about the end of February, 1924.

Rolling Stock

The Illinois Traction, Inc., is preparing to purchase seventeen new, one-man, light-weight, double-truck interurban safety cars for its Ottawa division, which was formerly known as the Chicago, Ottawa & Peoria Railway.

Houston Electric Company will, if it follows the recommendation of John A. Beeler to the city, purchase fifteen new one-man cars at a cost of $180,000.

Department of Street Railways, Detroit, Mich., has been authorized by the City Council to purchase fifty new double-truck Peter Witt type cars and one three-car train. The three-car train will be used for experimental purposes to determine its practicability on lines such as that on Woodward Avenue. A train of the kind proposed would be 122 ft. long and would require a motorman and three conductors to operate. The equipment would cost $29,230 and the cars making up the train would have a seating capacity of 134 passengers. Delivery on the three-car train is expected about Jan. 1 and on the first of the Peter Witt cars about Feb. 1. The sale of fourteen of the city's one-man cars has been authorized by the Council. These cars will be replaced by larger ones.

Cleveland Southwestern & Columbus Railway, Cleveland, Ohio, has purchased twelve new interurban cars to be built by the Cincinnati Car Company.

New Orleans Public Service, Inc., has purchased twelve new double-truck cars of the Perley A. Thomas Car Company, High Point, N. C.

Toronto Transportation Commission is planning either to purchase seventy new cars or rebuild a number of its old cars.

Havana Central Railroad, Havana, Cuba, has placed an order with the Wasson Car Company for six new cars.

Track and Line

Community Traction Company, Toledo, Ohio, will double track Sylvania Avenue from Martha Avenue to Jackman Road with extension of service on Tremainsville Road on the tracks of the Toledo & Western line. Extension will be made at a cost of $100,000. Double tracking in Sylvania Avenue is part of a program to repave and widen the thoroughfare.

New Orleans, La.—Two franchises affecting the reorganization and rerouting of the New Orleans Public Service, Inc., on the lines laid down in the Beeler report have been offered the Commission Council by Commissioner Paul H. Maloney of the Department of Public Utilities. One, covering the Elysian Fields Avenue franchise, provides, as a compromise to the Beeler suggestion, that the New Orleans Public Service, Inc., shall construct a single-track line on the upper side of Elysian Fields Avenue from North Claiborne Avenue to Hope Street, with a shuttle service from North Claiborne Avenue. The other franchise provides for the extension of the Broadway lines with double-track service from South Claiborne Avenue to Broad Place; thence on Broad Place to Almonaster Street, where it will resolve into a single-track line, continuing out Almonaster Street through such streets as residents in that section of the city, who are opposed to the Beeler recommendations, have approved.

Grand River Valley Railway, Grand Junction, Col., will be extended 3½ miles into the High Line district, one of the best farm land sections of the state, at an estimated cost of $65,000. The work will be started at once.

Citizens Traction Company, Oil City, Pa., is planning to lay a single track at the end of the double track on Main Street at Relief Street to the shops and offices of the National Transit Pump & Machine Company. This will provide service for the men employed in the Third Ward shops as soon after the closing of the suspension bridge as possible. Permission will have to be obtained from a number of sources, such as the city and the Erie Railroad.

Power Houses, Shops and Buildings

Wisconsin Public Service Corporation, Green Bay, Wis., completed work in replacing its 25-cycle generators at its High Falls hydro-electric plant with new 60-cycle generators. This is in line with its policy to change all plant equipment to 60-cycle generators and also to change all motors and meters on lines using current to 60 cycles, thus eliminating the need of frequency changers.

Paducah Electric Company, Paducah, Ky., is constructing a new power station which represents an investment of $370,000. It is expected that the new unit will be in operation early in 1924. The structure when complete will house a new 2,500-kw. turbine and boiler equipment of the most modern type. The unit is being erected adjacent to the old power plant and in time the two will be linked together. The combined generating capacity will be 6,000 kw.

Trade Notes

Transit Equipment Company, New York, N. Y., is establishing a new method to bring the bus to the electric railways by taking the latter's obsolete material in part payment for any buses they purchase.

Standard Underground Cable Company, Pittsburgh, Pa., announces the following changes in its Perth Amboy, N. J., organization: H. W. Fisher has been advanced in title to technical director of electrical engineering, while continuing also as manager of the lead cable and rubber departments. R. W. Atkinson has been appointed chief electrical engineer. G. J. Shurts has been made production manager of the lead cable department.

New Advertising Literature

Beckwith-Chandler Company, Newark, N. J., paint and varnish manufacturer, has ready for distribution a comprehensive sample booklet of its line of motor coach colors. This pamphlet will be of particular interest to companies operating and maintaining motor buses.

Reliance Electric & Engineering Company, Cleveland, has issued a thirty-two page booklet on electric motors. It describes how electric motors are to be chosen and used. It also gives methods of installing motors, rules for determining the size of motors required for different applications and an analysis of some troubles which may be encountered. Copies of the booklet will be sent to interested persons without charge.

Edison Lamp Works, Harrison, N. J., has issued a thirty-two-page pamphlet entitled "Lighting for Traffic Control." The booklet contains illustrations of many types of traffic signals and how they are operated.

Miller Trolley Shoe Company, Boston, has issued a new circular entitled "About Wire Wear." It features and describes tests of trolley wire wear over a period of six years on the Portland-Lewiston Interurban Railway division of the Androscoggin Electric Company. This road has been using Miller trolley shoes exclusively for many years, and the pamphlet gives interesting statistics of micrometer measurements made by the railway company's engineers on its trolley lines.

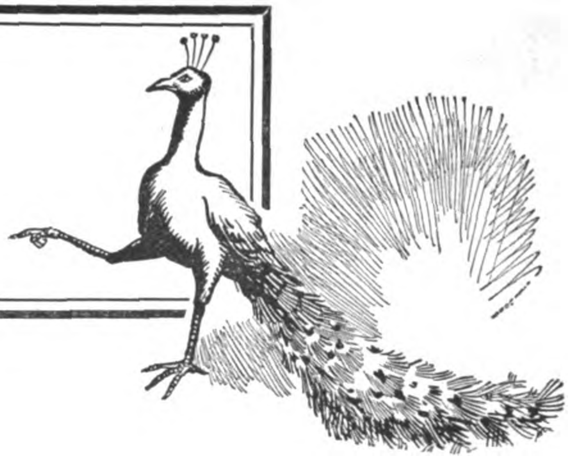
American Manganese Steel Company, Chicago Heights, Ill., has issued a six-page pamphlet, accompanied by illustrations, entitled "A Better Manganese Crossing."

Elliott Service Company, New York, N. Y., through its public safety division, has issued a pamphlet called "Reaching the Public with the Safety Idea." The pamphlet states that accidents can be prevented and it attempts to give the solution of the problem

On the 5-yard Line!

Every so often the crucial game is saved by the ability of one particular man to tackle the on-rushing opponent, and drag him down to a stand-still—

before he hits the goal!



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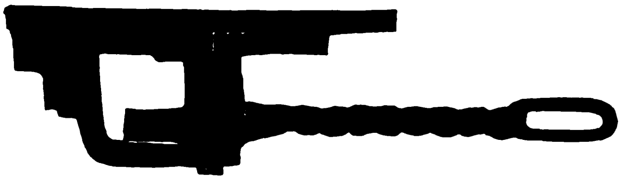
They can be depended upon to stop the car *before it hits* the object or obstacle on the track.

Peacock Brakes are fast; they have great reserve power and their chain winding capacity is sufficient to take care of any amount of slack. But above all else is their reliability, like that of the guard who saves the football game for his team.

It is that reliability factor which makes Peacock Brakes the most dependable equipment for electric railway cars, whether used as the regular service brake, or merely for emergency conditions.

Investigate! Then specify—Peacock Brakes



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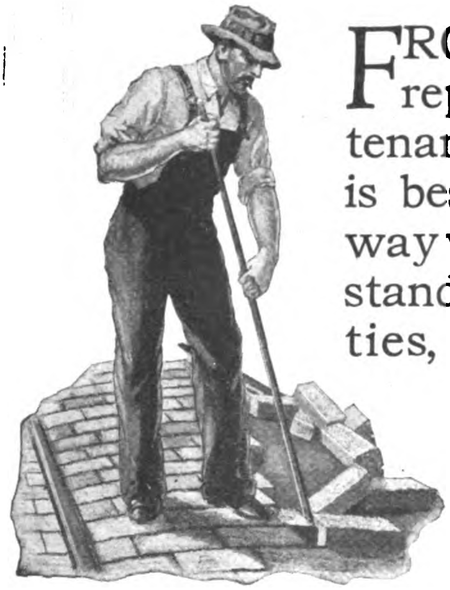

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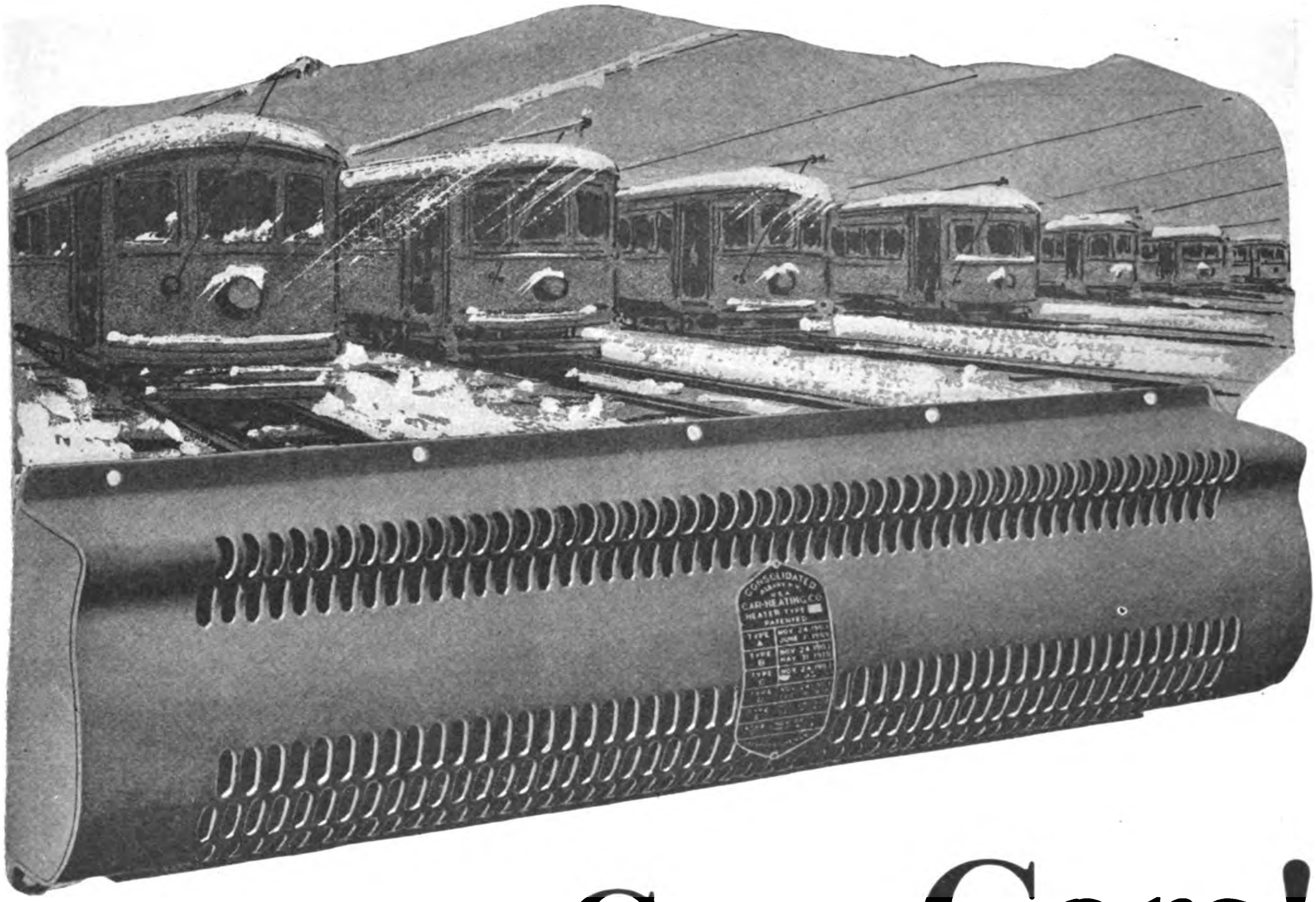

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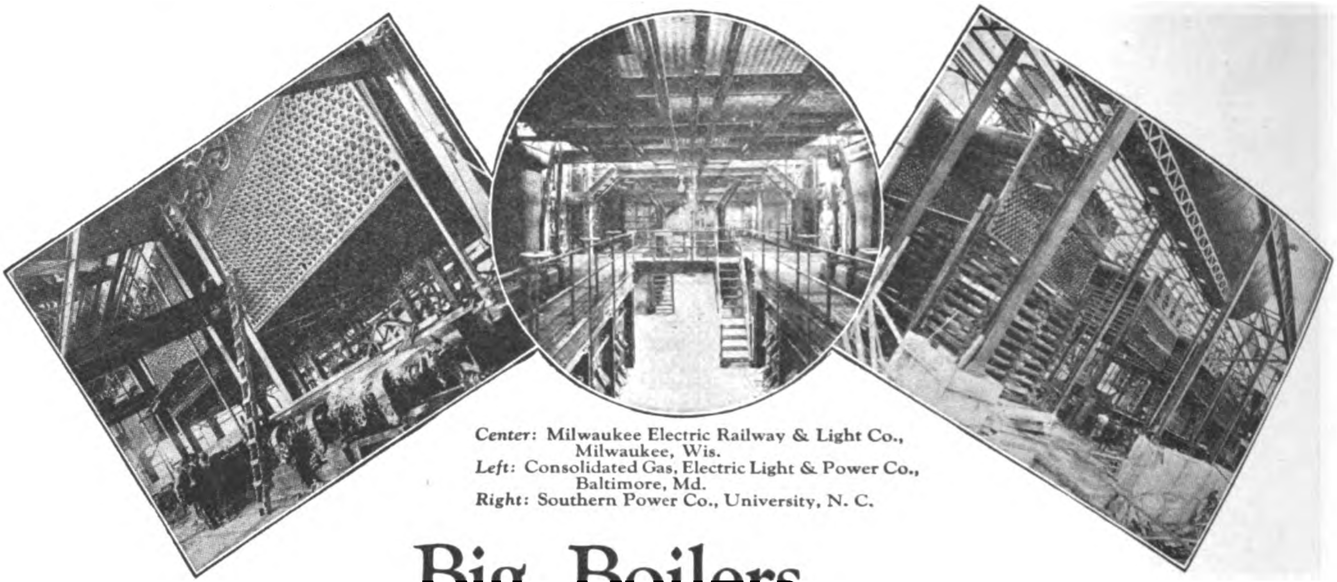

Center: Milwaukee Electric Railway & Light Co., Milwaukee, Wis.
Left: Consolidated Gas, Electric Light & Power Co., Baltimore, Md.
Right: Southern Power Co., University, N. C.

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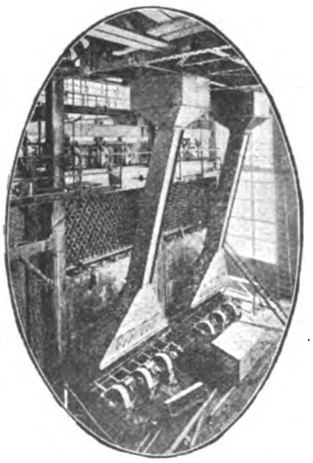
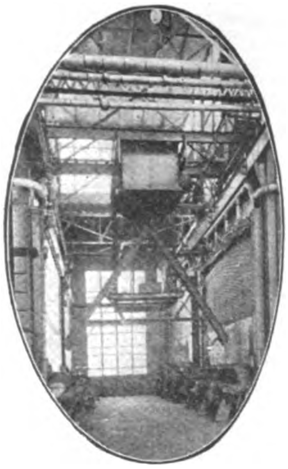
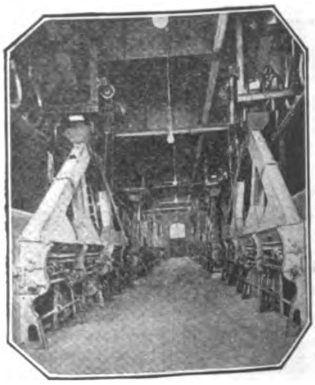


Turners Falls Power & Electric Co., Turners Falls, Mass.

Iowa Railway & Light Co., Cedar Rapids, Iowa



Dominion Power & Transmission Co., Hamilton, Ont.



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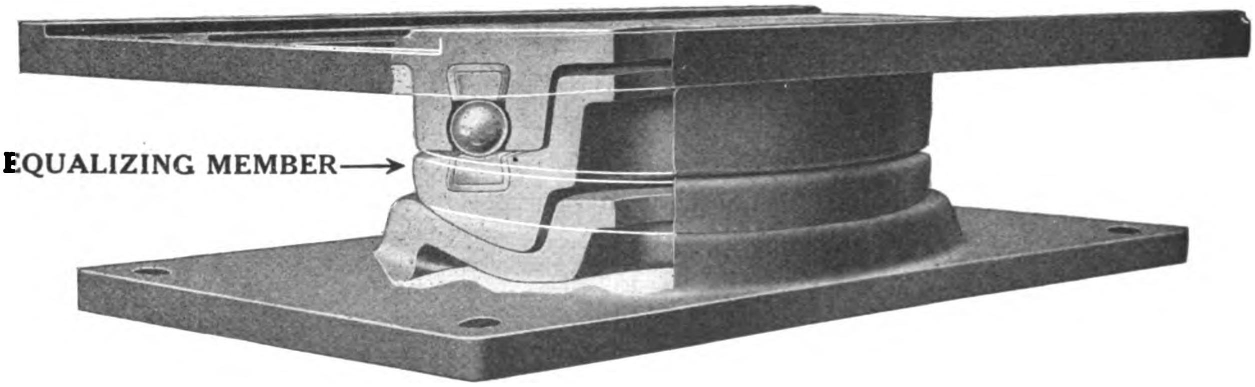

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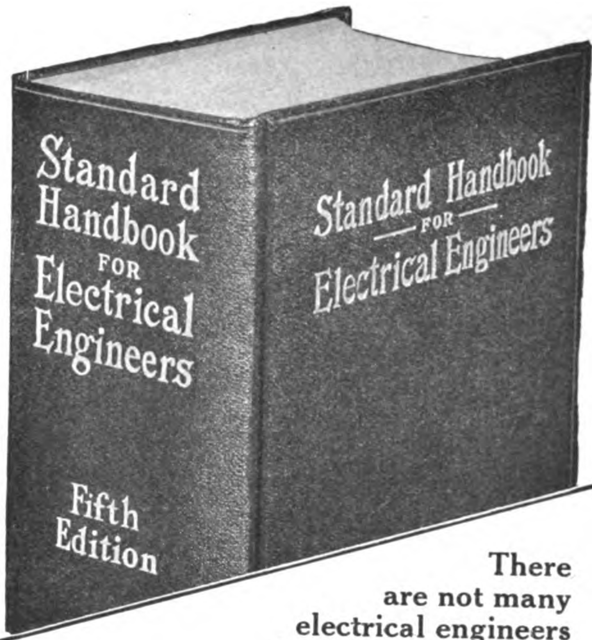
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—but it *should* be so with 97 years behind us

Mr. Moroso, General Storekeeper of New York's Great Third Avenue Railway System writes us:—

> "Perhaps it would be gratifying for you to know that the (snow sweeper) rattan received is undoubtedly the finest grade that has been received by us since the writer's connection with the company. Not only is the quality superior, but the uniformity of the product comes nearer to our specifications than any other shipment of this material that we have received. This means a great deal to our mechanics in making the broom heads."

It's just the same with Car Seats

You can't spend 97 years on a product without producing something worth while. You'll find it in the trim appearance, the roomy comfort and the underlying structural strength of Heywood-Wakefield Car Seats.

Write or phone to our nearest office for prices and illustrations.

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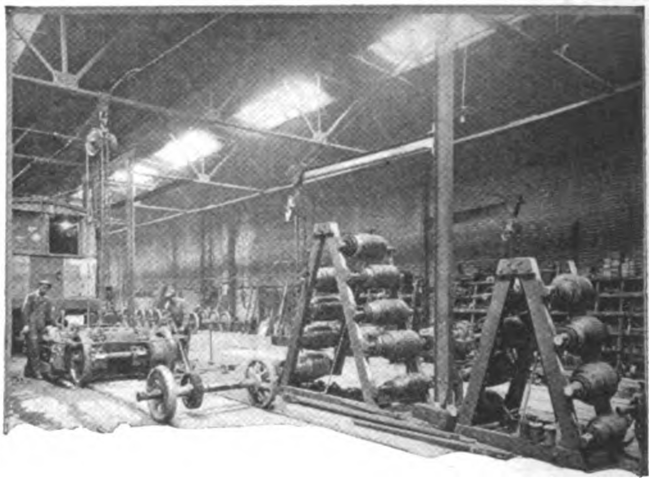
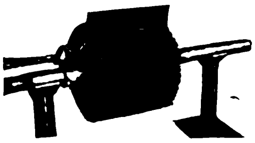


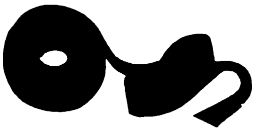
Fix up those armatures— use the Irvington Specification

Irv-O-Slot



It's a simple thing to lay down a piece of combination slot insulation (cut to specification) and insert the coil or coils. Irvington slot insulation is made up of a layer of varnished cambric and a layer of fibrous paper solidly cemented together with a flexible, insulating compound that will not dry out.

Seamless Bias Tape

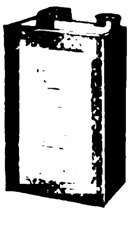


Irvington Seamless Bias Tape is better. Every inch is effective insulation of uniform thickness. It makes smooth windings. It also can be applied with taping machines.

Furnished in Yellow and Black .007 in. to .015 in. thick, ¾ in. to 36 in. wide, on paper cores ⅞ in. or 1⅞ in. hole, standard length rolls, 36 and 72 yds.

Try it once and see how it cuts winding costs. Send for samples and prices.

Varnishes



Black baking insulation varnish is a good one for armature and field coils—magnet coils, etc. It is a most elastic and durable varnish. Can be thinned with benzine. Moisture proof and a good insulator. Irvington Black Finishing Varnish—a spirit varnish for finishing coats on motors, etc.

Place that requisition today.

IRVINGTON VARNISH & INSULATOR Co.
Irvington, New Jersey.

Established 1905

Sales Representatives:

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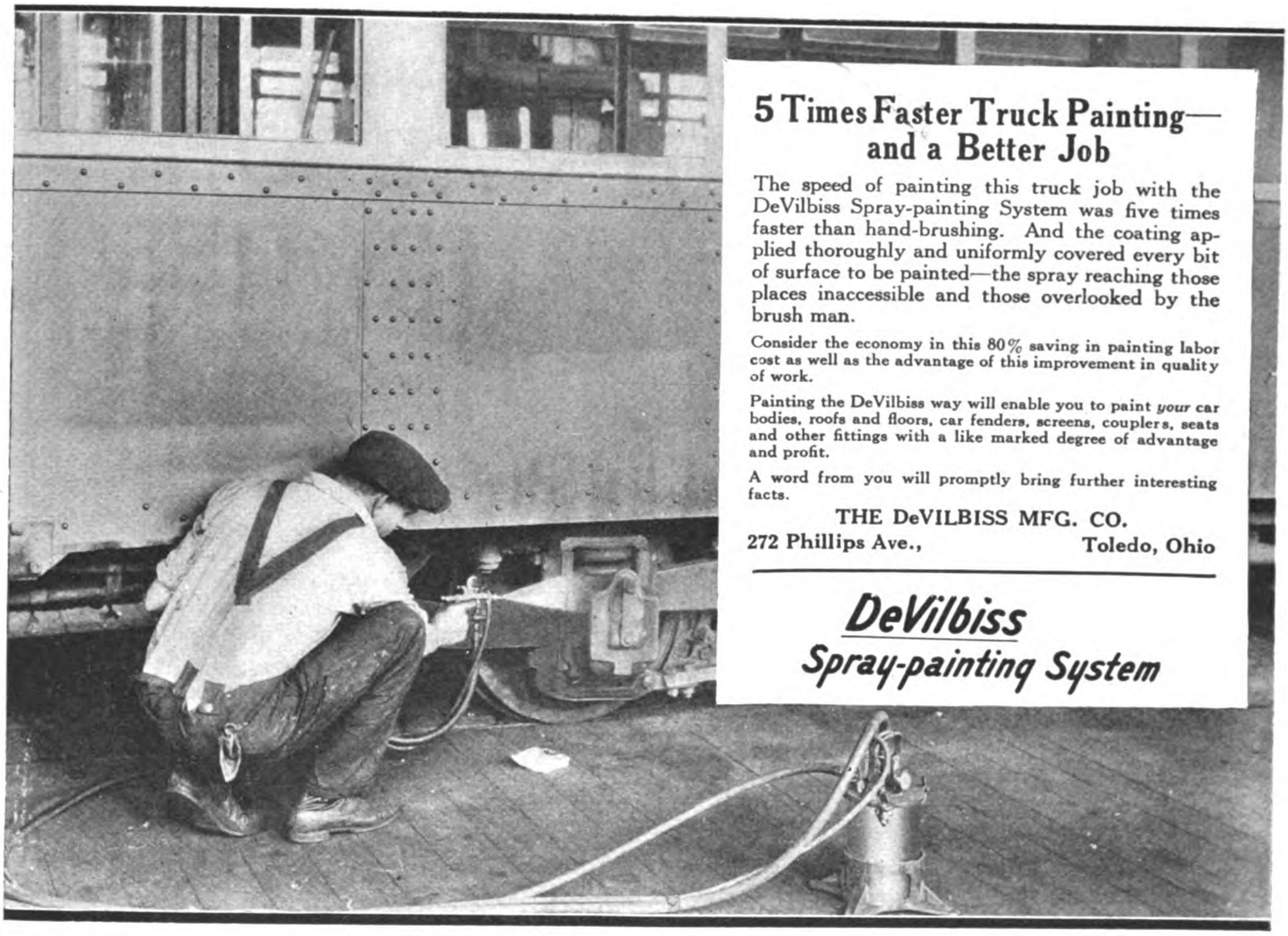

5 Times Faster Truck Painting—and a Better Job

The speed of painting this truck job with the DeVilbiss Spray-painting System was five times faster than hand-brushing. And the coating applied thoroughly and uniformly covered every bit of surface to be painted—the spray reaching those places inaccessible and those overlooked by the brush man.

Consider the economy in this 80% saving in painting labor cost as well as the advantage of this improvement in quality of work.

Painting the DeVilbiss way will enable you to paint *your* car bodies, roofs and floors, car fenders, screens, couplers, seats and other fittings with a like marked degree of advantage and profit.

A word from you will promptly bring further interesting facts.

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272 Phillips Ave., Toledo, Ohio

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Spray-painting System

Don't Experiment with Life Guards

Order

H-B LIFE GUARDS

to be manufactured by

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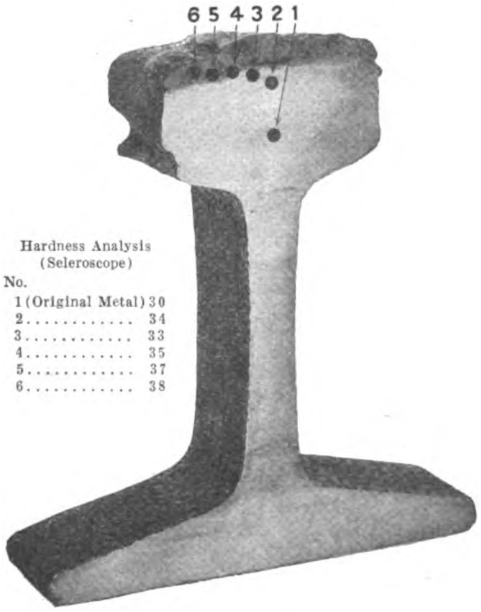
The guard which has a long life-saving record, is of sound construction and economical to maintain.

ACCEPT NO SUBSTITUTE

For Welding High Carbon Steel

PAGE HIGH CARBON ELECTRODES



Hardness Analysis (Seleroscope)

No.	
1 (Original Metal)	30
2	34
3	33
4	35
5	37
6	38

The manufacture and reclaiming of High Carbon Steel parts by welding can best be accomplished by use of suitable welding metal. The data presented herewith is typical of results secured with Page High Carbon Electrodes, and indicates qualities more than equal to the original metal.

Conform in all respects to A.W.S. specifications, E—No. 1-C.

Look for red tag, and red-colored ends.

PAGE STEEL AND WIRE COMPANY
An Associate Company of the American Chain Co., Inc.
Bridgeport, Conn.
DISTRICT SALES OFFICES:
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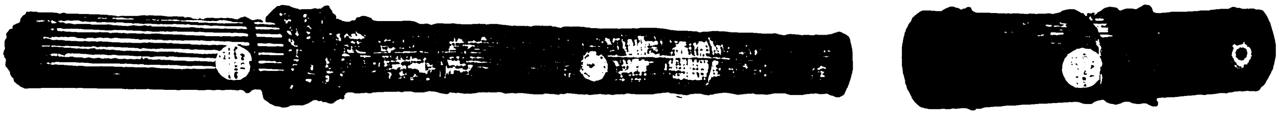
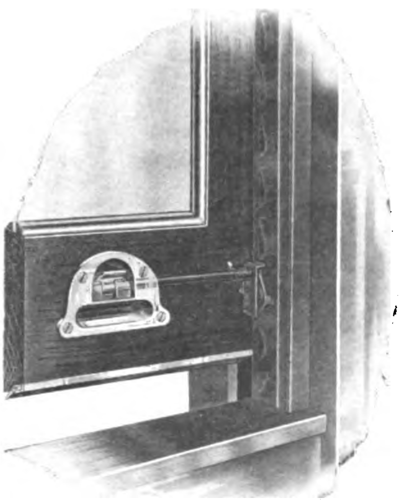


An Assurance Of Safety



Extension Lock A-501 with phantom view of detents in steel stop casing. Racks can be furnished for wood stop casings if desired.

LEADING railways for years have recognized the great degree of safety built into Edwards car devices and have specified these devices with the assurance that they are safeguarding their passengers against accidents.

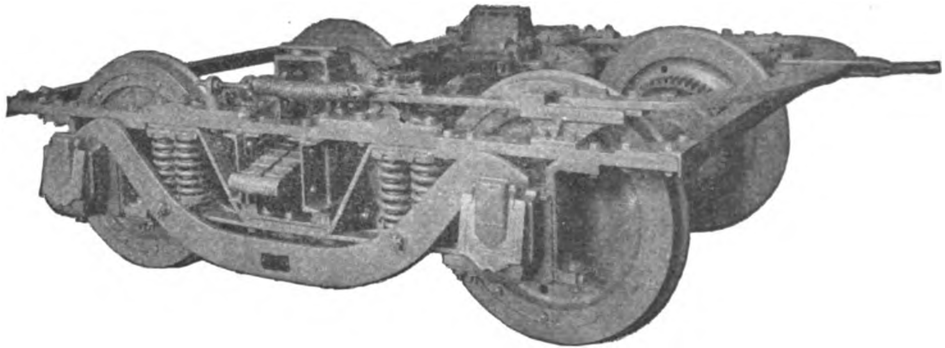
An Edwards Lock, Extension Lock No. A-501, illustrated to the left, for instance, positively locks and is safe at all times. It holds the sash firmly in position and never allows the sash to slam shut.

In addition, Edwards devices possess the cardinal features of strength, durability and ease of installation, which, combined with safety, make their use a matter of economy.

THE O.M.EDWARDS CO. INC.
Maine Office and Factory
SYRACUSE, N. Y.

LEADERS SINCE 188

Baldwin Improved Motor Trucks for Electric Interurban and Street Railway Service



Baldwin Type "A" Truck used on the Osaka Electric Railway and also on the Osaka Tetsudo Railway of Japan. Similar Trucks are used on many American and Foreign Electric Railways.

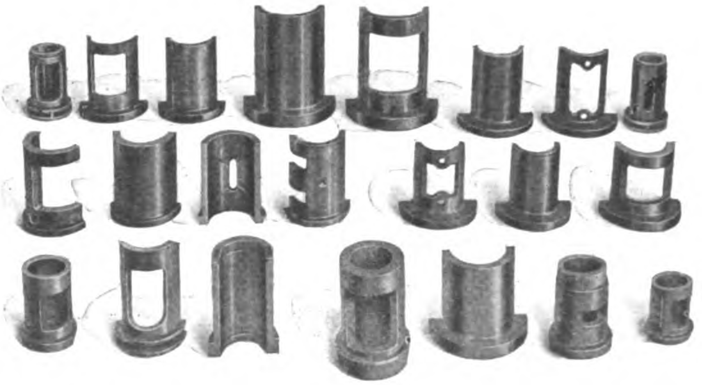
BALDWIN Electric Motor Trucks are designed and built with the same engineering skill and excellence of workmanship as are Baldwin Locomotives.

We built trucks to meet the most severe conditions of high speed electric interurban and street railways; for use under motor cars on electrified sections of steam lines; for double truck electric locomotives used in switching and local freight service; for the requirements of city and interurban electric freight and express service.

For simplicity, strength, low cost of maintenance and perfect riding qualities, Baldwin Trucks cannot be excelled.

Baldwin representatives in all principal countries of the world.
Detailed information upon request.

THE BALDWIN LOCOMOTIVE WORKS
PHILADELPHIA, U. S. A.
Cable Address, "Baldwin, Philadelphia"



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COLUMBIA
Armature,
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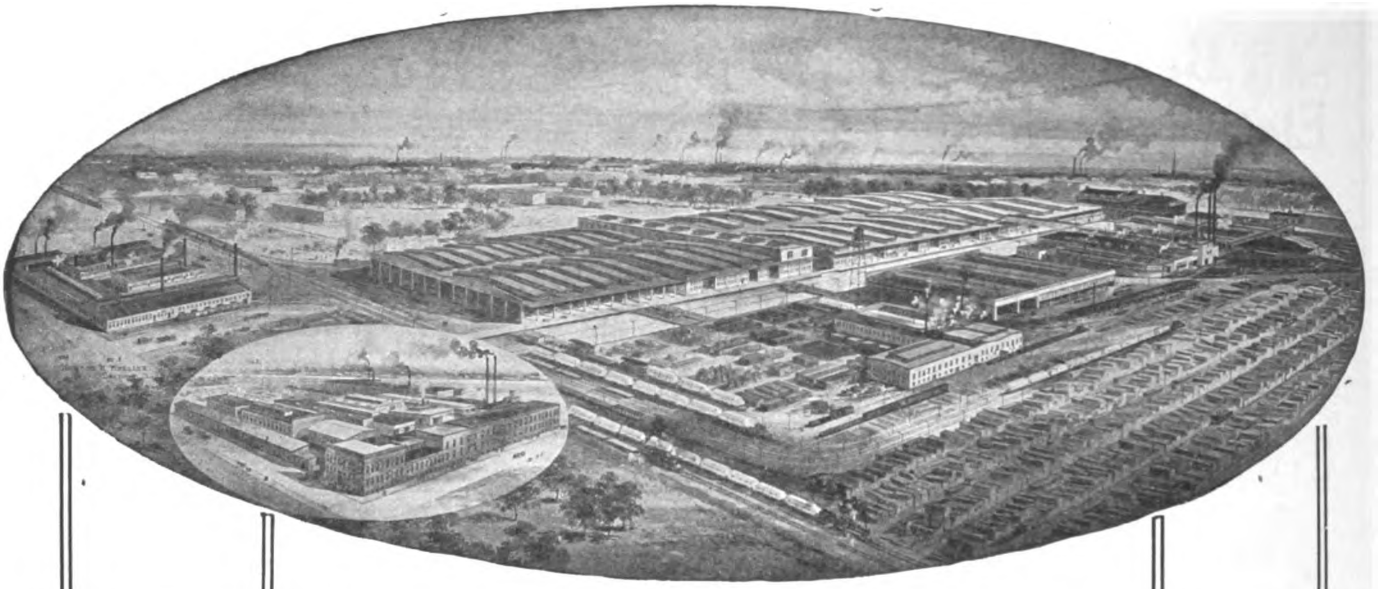
—have been adopted by many roads as standard
because of their long wearing quality

COLUMBIA 1892 MACHINE WORKS

3313 Atlantic Ave., Brooklyn, N. Y.



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- City Cars
- Interurbans
- Safety Cars
- Motor Buses
- Trolley Buses

Qualified—

Qualified — by experience, size and established reputation to render "quality service" to electric railway companies.

Send for circulars.

St. Louis Car Company
St. Louis, Mo.
"The Birthplace of the Safety Car"

"Quality" Equipment

- Trucks
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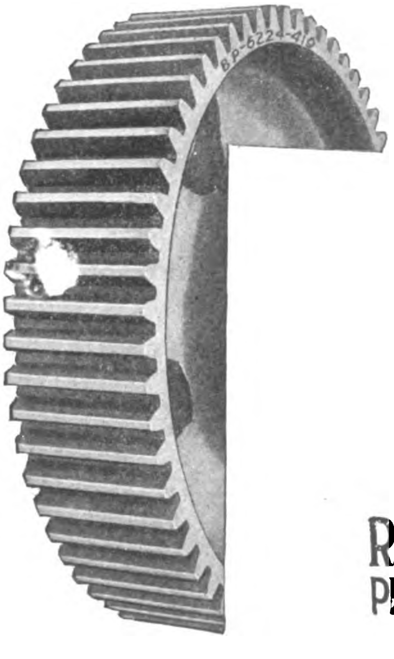

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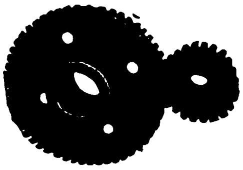
NUTTALL has every possible facility for making the best gears and pinions that can be produced, beginning with experienced designer and ending with critical inspectors and careful shippers. It would be pretty hard for any other plant to duplicate a Nuttall gear, as we have been over thirty years gaining our experience, methods and equipment.

R.D. NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

MEMBER ELECTRIC RAILWAY ASSOCIATION AERA

All Westinghouse Electric and Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.



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"Tool Steel"
Gears and Pinions
have proven their
superiority
over every grade on
the market. Ask us
for our "evidence".

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Griffin Wheel Company
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For Street and Interurban Railways

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Every Brush Fully Guaranteed

Write today for Catalog B-3
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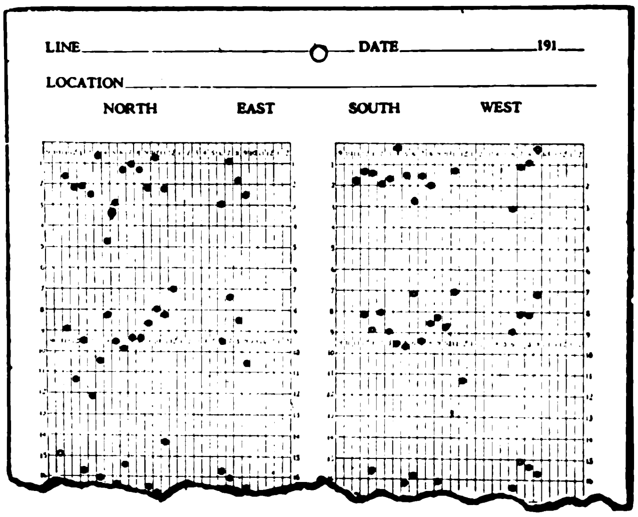

Are You Maintaining Schedules?

Increase your returns by improving the *service* on which they depend. The *cars themselves* mark their time on the daily chart of the Nachod Automatic Headway Recorder—a record of operation for the superintendent, easy to read and file for reference. The chart shows how late or early the car is according to schedule. The Recorder points out irregularities and "slack" in the schedule. An instrument with many uses—an efficient tool for the careful manager. Write for Recorder Manual. Nachod Signal Co., Inc., Louisville, Ky., Manufacturers of Block Signals and Highway Crossing Signals.

Nachod Headway Recorders

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BARE COPPER WIRE AND CABLE
TROLLEY WIRE
WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
MAGNET WIRE

AMERICAN ELECTRICAL WORKS
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No. 2

AIMCo REG. U. S. PAT. OFF.

Electric Railway Automatic Signals

for Accessibility and Reliability

EST. 1883 AIMCo INC. 1916
"American" Insulating Machinery Company
REG. U.S. PAT. OFF.
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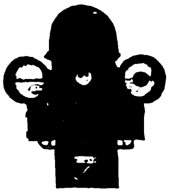
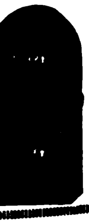
Sales Agents:
Electric Service Supplies Co.
Philadelphia New York Chicago



U. S. ELECTRIC AUTOMATIC SIGNAL
for single track block signal protection
United States Electric Signal Co.
West Newton, Mass.

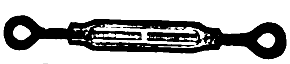


Chapman Automatic Signals
Charles N. Wood Co., Boston

HUBBARD TURNBUCKLES

Made of Drop Forged Open Hearth Steel

Galvanized by the Double Hot Process.



Type A, Eye and Eye

HUBBARD & COMPANY
Pittsburgh Chicago

STANDARD
Wires, Cables, Cable Accessories
Superior quality, economical prices
Standard Underground Cable Co.
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INSULATED WIRES AND CABLES
JOHN A. ROEBLING'S SONS CO., TRENTON, NEW JERSEY

Transmission Line and Special Crossing Structures, Catenary Bridges
WRITE FOR OUR NEW DESCRIPTIVE CATALOG
ARCHBOLD-BRADY CO.
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Lapp Insulators
Lapp Insulator Co. Inc. Le Roy, N.Y.
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ANACONDA TROLLEY WIRE
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Conway Building, Chicago, Ill.
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General Offices: Waterbury, Conn.

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CREOSOTERS

Washington Court House, Ohio

Cross Ties Bridge Timbers
Lumber Posts
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Treated and Untreated

We solicit your inquiries

Creosoting Plant located
Washington Court House, Ohio
On—Penna. R.R., B. & O. R.R., D. T. & I. R.R.
Operating Mills in Southern Ohio

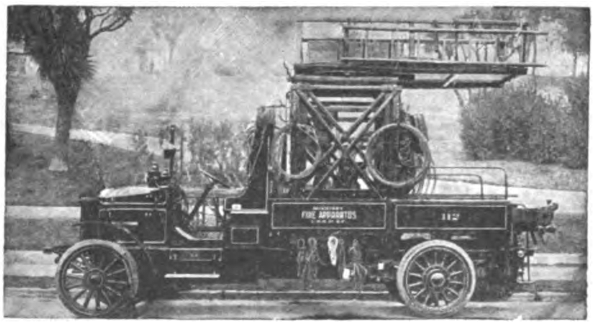
Drip Points for Added Efficiency

They prevent creeping moisture and quickly drain the petticoat in wet weather, keeping the inner area dry.

The Above Insulator—No. 72—Voltages—Test—Dry 64,000. Wet 31,400. Line 10,000.

Our engineers are always ready to help you on your glass insulator problem. Write for catalog.

Hemingray Glass Company
Muncie, Ind.
Est. 1848—Inc. 1870



TRUCK WITH TOWER IN RUNNING POSITION

TRENTON TOWER

This 3-Section

is not only more convenient, but stronger than the older type.

The top section is reinforced by the intermediate section. The 3-section design makes it possible to raise the platform 16 inches higher and drop it 12 inches lower than can be done with the old-style 2-section tower.

We'll gladly send you details.

J. R. McCARDELL CO.
Trenton, New Jersey, U. S. A.

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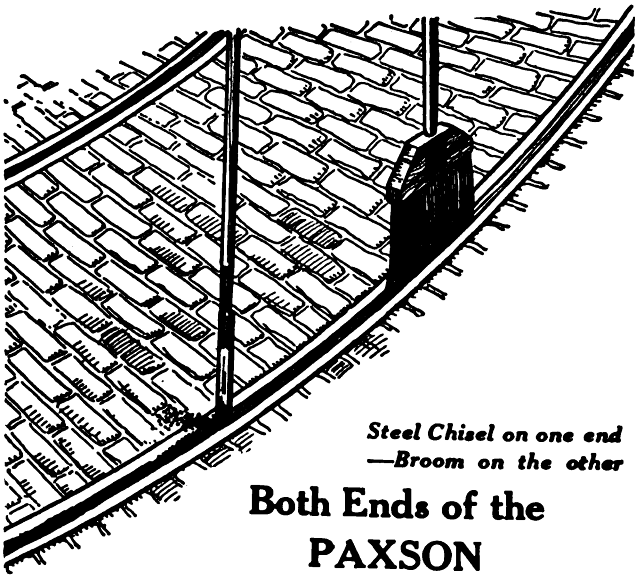
PHILADELPHIA & READING R.R.

KERITE INSULATED WIRE & CABLE COMPANY
NEW YORK CHICAGO

GET OUT, DIRT!



Steel Chisel on one end
—Broom on the other

Both Ends of the
PAXSON
Track Broom are *Business* Ends

—for which reason they have been the choice of railway men for 25 years.

Made of flat steel spring wire. Fits frogs, switches and grooves. Has strong ash handle with steel chisel on other end. Broom is light in weight but strong in construction. Send for a sample—you will be pleased.

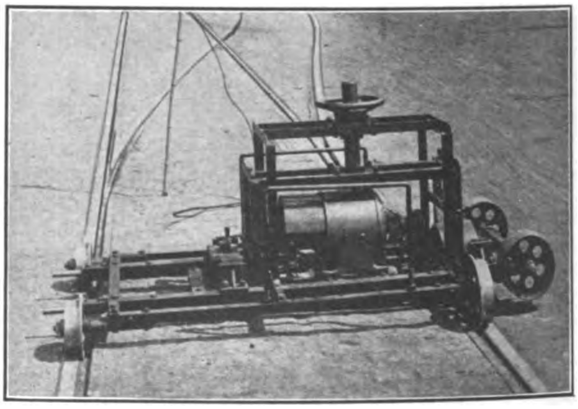
J. W. PAXSON CO.
Manufacturers
Nicetown Lane and D St., Philadelphia, Pa.

RAIL
SEYMOUR
GRINDERS

Why the MIDGET is popular

Appeals to the practical trackman because it is light and fast, because it will do any kind of grinding, and, last but not least, because it is inexpensive to purchase and economical to operate.

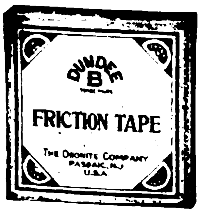
E. P. Seymour Rail Grinder Co.
Waltham, Mass.



DUNDEE "A" AND "B" FRICTION TAPES

DUNDEE
A
FRICTION TAPE
THE OKONITE COMPANY
PASSAIC, N.J.
U.S.A.

Great Adhesive Strength
High Quality
Long Life
Price Right



Write for Samples and Circulars

THE OKONITE CO., Passaic, N. J.
Incorporated 1884
Sales Offices: New York—Atlanta—San Francisco
Agents: Central Electric Co., Chicago, Ill.; Pettingell-Andrews Co., Boston, Mass.; The F. D. Lawrence Electric Co., Cincinnati, Ohio; Novelty Electric Co., Philadelphia, Pa.

OKONITE
TRADE MARK
REG. U.S. PAT OFFICE

International Creosoting
& Construction Co.
Galveston, Texas

Plant—Texarkana Beaumont Galveston

MONEY SAVERS TO RAILWAYS

Treated railway ties, poles, piling, bridge timbers, etc.

See our full page advertisement in last week's issue.

Shaw Lightning Arresters

Standard in the Electric Industries for 35 years

Henry M. Shaw
150 Coit St., Irvington, Newark, N. J.

Metal Safety Railway Tie Co.
522 North American Bldg., Philadelphia, Pa.

All-metal cross ties
Types for open and closed tracks
"More flexible than wood"

See advertisement, issue, Sept. 29, page 86.
Ask for circular on either type. *Prices upon application.*

RAMAPO AJAX CORPORATION

Ramapo Automatic Return Switch Stands for Passing Sidings

RACOR
TRADE MARK

RACOR Tee Rail Special Work.

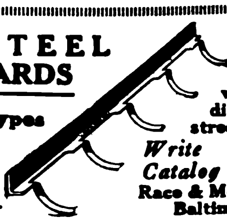
Manganese Construction

GENERAL OFFICES: HILLBURN, NEW YORK
Chicago New York Superior, Wis. Niagara Falls, N. Y.
Canadian Ramapo Iron Works, Ltd., Niagara Falls, Ont.

GODWIN STEEL
PAVING GUARDS

Adapted to all types of rails and paving.

W. S. GODWIN CO., Inc.



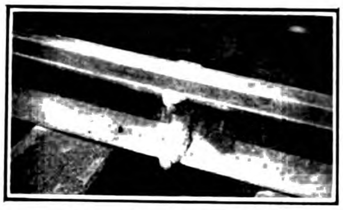
Proven by service to economically prevent seepage and disintegration of street railway paving.

Write for Illustrated Catalog No. 20.
Race & McComas Sts.,
Baltimore, Md.

FERALITE

An up-to-date and most economical process for the Aluminothermic welding of rail joints. Makes the joint stronger than the rail itself.

ALUMINO-THERMIC FERALITE WELDING MIXTURE



Feralite Welded Joint

Special advantages — (1) Rail ends are butted together and easily aligned, no inserts needed to fill in or adjust. (2) Smaller portions of material used. (3) Grinding reduced to the minimum, only a slight touching up is needed.

The Feralite Rail Welding Process eliminates rail joints at a lower cost than any other process. Write for full details.

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Roselle Park, New Jersey

American Rail Bonds

CROWN
UNITED STATES
TWIN TERMINAL
SOLDER
TRIPLEX

Arc Weld and Flame Weld

Send for new Rail Bond Book

American Steel & Wire Company
CHICAGO
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High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
COMPLETE LAYOUTS
IMPROVED ANTI-KICK BIG-HEEL SWITCHES
HARD CENTER AND MANGANESE CONSTRUCTION

New York Switch & Crossing Co.
Hoboken, N. J.

Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY
Johnstown, Pa.

Sales Offices:
Atlanta Chicago Cleveland New York
Philadelphia Pittsburgh
Pacific Coast Representative:
United States Steel Products Company
Los Angeles Portland San Francisco Seattle
Export Representative:
United States Steel Products Company, New York, N. Y.

Series Type

Arc Welding and Bonding Outfit

Rugged series resistance coil
Indestructible Mica insulation
Normal welding current at half voltage

The Electric Railway Improvement Co.
Cleveland, Ohio

ERICO RAIL BONDS

BARBOUR-STOCKWELL CO.
205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of
Special Work for Street Railways
Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
Kerwin Portable Crossovers
Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

WHARTON
Special Trackwork
For Street and Steam Railways

Steel Castings Gas Cylinders
ORIGINATORS OF
Manganese Steel Trackwork

WM. WHARTON JR. & CO., Inc.
Easton, Pa.
Other Plants:
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MICANITE
INSULATOR
Reg. U. S. Pat. Off.

ELECTRICAL INSULATION

Micanite armature and commutator insulation, commutator segments and rings, plate, tubes, etc., Empire oiled insulating materials; Linotape; Kablak; Mico; and other products—for the electrical insulating requirements of the railway.

Catalogs will gladly be furnished

MICA INSULATOR COMPANY
Sole Manufacturers of Micanite
Established 1893
68 Church St., New York 542 So. Dearborn St., Chicago
Works: Schenectady, N. Y.
8-F

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to consult the
SEARCHLIGHT SECTION
of this issue

It may hold the very opportunity for which you have been seeking

If you do not find what you want, perhaps a small ad will help you.

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$5 or less per inch

UNDISPLAYED ADS
Positions Wanted—4 cents a word
All Others—8 cents a word

THE BABCOCK & WILCOX COMPANY
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DALLAS, TEX., 2001 Magnolia Building
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WORKS
Bayonne, N. J.
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Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893

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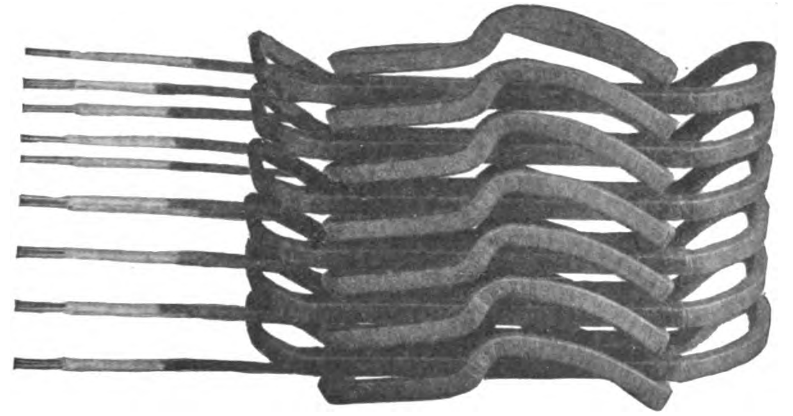
SEATTLE, L. C. Smith Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, Royal Bank Building

ALLIS-CHALMERS
MILWAUKEE, WIS. U. S. A.
Electrical Machinery, Steam Turbines, Steam Engines, Condensers, Gas and Oil Engines, Air Compressors, Air Brakes

BUCKEYE JACKS
high-grade R. R. Track and Car Jacks
The Buckeye Jack Mfg. Co.
Alliance, Ohio

FORD TRIBLOC
A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only block that carries a five-year guarantee.
FORD CHAIN BLOCK CO.
Second and Diamond Sts., Philadelphia

A Single Segment or a Complete Commutator
is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.
Cameron Electrical Mfg. Co., Ansonia, Connecticut



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Your replacement coils should be absolutely dependable.

More than thirty years experience in the production of armature and field coils for railway motors has qualified us to give you coils which will stand up in the most severe service. They are made in a shop specializing on this work alone. Every job receives the constant supervision of a manager who has made coils ever since the days of coil-wound armatures.

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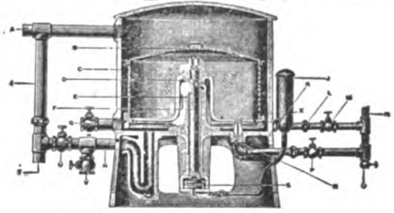
Ajax Building, Cleveland, Ohio

Don't throw the oily waste away!



Save Money By Reclaiming It!

This oil extracting machine is reclaiming hundreds of gallons of perfectly good lubricating oil and many pounds of waste for the Milwaukee Electric Railway & Light Co. as well as many other companies. It will do the same for you. It is widely used as a real economy producing equipment.

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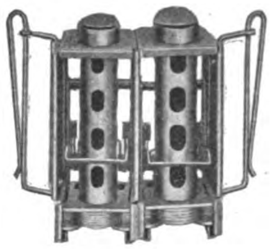

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The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

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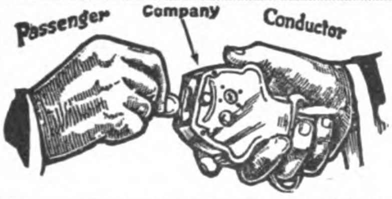

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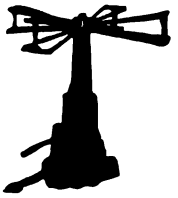
Rooke Automatic Register Co.
Providence, R. I.



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PEREY TURNSTILES or PASSIMETERS

Use them in your Prepayment Areas and Street Cars

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75% of the electric railways use

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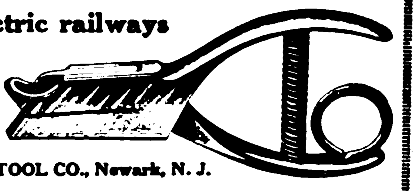

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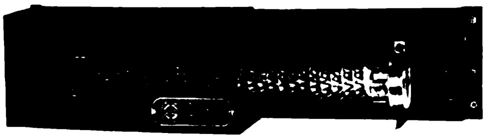

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PS HEATERS

Car Heating and Ventilation

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

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N-L VENTILATORS

for Electric Railways and Motor Buses.
Unexcelled for ventilation and appearance.

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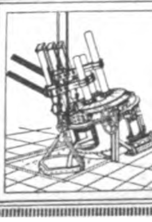

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Ten Standard Sizes 1/16 to 24 Tons Capacity
Most Rapid and efficient for making
Tool Steels, Alloy Steels, Forging Steels
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Ohmer Indicating and Recording Fare Registers

are especially well adapted for use in one-man cars, either for city or interurban service.

The operation is quick and snappy. Each fare is clearly indicated and a correct printed record made of it.

Ohmer Fare Registers offer the only means of placing fare collecting on an absolutely correct business basis.

OHMER FARE REGISTER CO.
Dayton, Ohio

193
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Type R-10

International Registers

Made in various types and sizes to meet the requirements of service on street and city system. Complete line of registers, counters and car fittings.

Exclusive selling agents for HEEREN ENAMEL BADGES.

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"Boyerized" Products Reduce Maintenance

- Bemis Trucks
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Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

Bemis Car Truck Co., Springfield, Mass.

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Trade Mark Reg. U. S. Pat. Off.

Made of extra quality stock firmly braided and smoothly finished.
Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.

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DIFFERENT kinds of service require different modes of treatment. For years we have specialized on Catchers and Retrievers exclusively. We can satisfactorily meet every condition.

We can give you the Ratchet Wind, the Emergency Release, the Free-Winding Spring, the Drum Check, and other absolutely exclusive features.

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KASS SAFETY TREADS
HIGH
in efficiency and lasting qualities
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in weight, initial and upkeep costs
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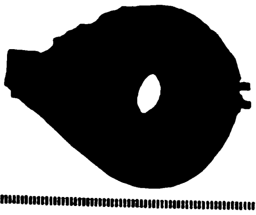

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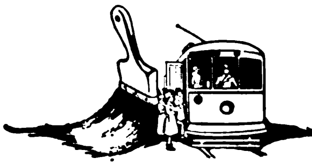
One-Piece Gear Cases
Seamless—Rivetless—Light Weight
Best for Service—Durability and Economy. *Write Us.*
Chillingworth Mfg. Co.
Jersey City, N. J.



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Sells Transportation

Let our experts on railway car finishing demonstrate Beckwith Chandler paints and varnishes. Write for details.

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Offices in all Principal Cities
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E. R. J.

POSITIONS VACANT

COMPETENT general superintendent wanted, age between 30 and 45 years, City system, about 30 miles of track, location, Williamsport, Pa. Give full outline of experience, references and salary desired first letter. P. O. Box 371, Williamsport, Pa.

SHOP foreman wanted to take charge of car shop on interurban line operating ten cars. State experience and salary expected. P-621, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

POSITIONS WANTED

ELECTRIC arc welder, experienced in joint welding, bonding and surface work. Can furnish good references. Open for immediate employment. PW-618, Elec. Ry. Journal, Leader-News Bldg., Cleveland, Ohio.

MR. MANAGER, are you in the field for a superintendent of transportation? If so, you should realize that practical experience is an important factor in the successful handling of this department. The writer of this ad has a proven successful record of nineteen years on city, suburban and interurban properties and can furnish high grade refeernces as to character and ability to get results on any property regardless of size or condition of same; at present with large property; personal reasons for making a change. PW-617, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

MASTER mechanic, city or interurban railway, experienced on all branches. 14 years' experience. PW-619, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

POSITIONS WANTED

WANTED position by master mechanic, 18 years' electric railway maintenance, rebuilding cars, track, trolley and rewinding armatures. Best of reference. PW-620, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

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1—Double truck express car with snow plow ends. Operated by air. Brill truck. Complete equipment overhauled.

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ROLLED STEEL WHEELS

50 to 100 used 36-in. or 37-in., not less than 34-in. diameter.

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Clinton and Chestnut St., Ft. Wayne, Ind.

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Cars, Locomotives, Tanks, Steel Piling
Fairbanks-Morse standard gage Gasoline Motor Car; seats 34 people.

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St. Louis, Mo.

Good Relaying Rails

Are as Serviceable as New Rails, with a Big Saving on the Price

We have ready for prompt shipment First-Class Relaying Rails in various weights. Get in touch with us, stating what weight rail and tonnage desired, and we will submit quotations.

HYMAN-MICHAELS COMPANY

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- 50—Controllers, K-28-B; K-12.
- 35—B-2 Compressors.

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W. C. Lincoln, Manager Sales and Engineering

National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., N. Y.

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- **Pittsburgh Forge & Iron Co.'s Products**
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- **Turnstile Car Corporation—Turnstiles**
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- **Power Saving and Inspection Meters**
- **Fort Pitt Spring & Mfg. Co., Springs**
- **C-H Electric Heaters**
- **Garland Ventilators**
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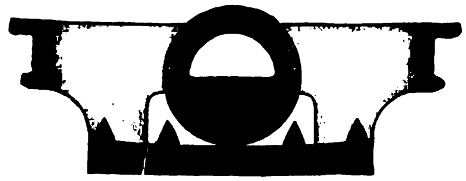
The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

THE STAR BRASS WORKS

KALAMAZOO, MICH., U. S. A.



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RAILWAY UTILITY COMPANY

Sole Manufacturers

"HONEYCOMB" AND "ROUND JET" VENTILATORS
for Monitor and Arch Roof Cars, and all classes of buildings:
also ELECTRIC THERMOMETER CONTROL
of Car Temperatures.

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Write for Catalogue

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Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

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Ingersoll-Rand Co.

Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Elec. Service Supplies Co.

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Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

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Bemis Car Truck Co.
Bethlehem Steel Co.
St. Louis Car Co.

Axle Straighteners
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Westinghouse E. & M. Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

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Int. Register Co., The

Barges, Steel
American Bridge Co.

Bearings and Bearing Metals
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Columbia M. W. & M. I. Co.
General Electric Co.
Gilbert & Sons B. F. Co., A.
St. Louis Car Co.
Westinghouse E. & M. Co.

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Baldwin Locomotive Works
Stucki Co., A.

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Columbia M. W. & M. I. Co.
Consolidated Car Heati'g Co.
Elec. Service Supplies Co.
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Boilers
Babcock & Wilcox Co.
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Amer. Steel & Wire Co.
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Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.
Rail Welding & Bonding Co.

Bonds, Rail
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
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Railway Track-work Co.
Rail Welding & Bonding Co.
Westinghouse E. & M. Co.

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Barbour-Stockwell Co.
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Brill Co., The J. G.
Columbia M. W. & M. I. Co.
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Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
St. Louis Car Co.
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Brass & Bronze Products
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Bridges & Buildings
American Bridge Co.

Brooms, Track, Steel and Rattan
Amer. Rattan & Reed Mfg. Co.
Passon Co., J. W.

Brushes, Carbon
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Le Carbone Co.
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U. S. Graphite Co.

Brushes, Wire, Pneumatic
Ingersoll-Rand Co.

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Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Bunkers, Coal
American Bridge Co.

Bus Bars
American Copper Products Corp.

Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.

Bus Seats
Hale-Kilburn Co.
Heywood-Wakefield Co.

Bushings, Case Hardened and Manganese
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Brill Co., The J. G.
St. Louis Car Co.

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Irvington Varnish & Ins. Co.
Mica Insulator Co.

Carbon Brushes (See Brushes, Carbon)

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Cars, Second Hand
Electric Equipment Co.
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Wood Co., Chas. N.

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Pantasote Co., The

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Cleveland Fare Box Co.

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Economy Elec. Devices Co.
Elliot-Thompson Elec. Co.
General Electric Co.
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Internat'l Register Co., The
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Wood Co., Chas. N.

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Crossing Foundations
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Crossings
Ramapo Ajax Corp.

Crossing Signals (See Signals, Crossing)

Crossing, Frog & Switch
Wharton, Jr., & Co., Wm.
Ramapo Ajax Corp.

Crossing Manganese
Ramapo Ajax Corp.

Crossings, Track (See Track, Special Work)

Crossings, Trolley
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.

Curtains and Curtain Fixtures
Brill Co., The J. G.
Edwards Co., Inc., O. M.
Elec. Service Supplies Co.
Morton Mfg. Co.
Pantasote Co., The
St. Louis Car Co.

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Elec. Equipment Co.
Hyman, Michaels
Indiana Service Corp.
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Wish-Service, P. Edward

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Byllesby & Co., H. M.
Day & Zimmerman, Inc.
Drum & Co., A. L.
Ford, Bacon & Daviis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelly Cooke & Co.
Ong, Joe R.
Richey, Albert S.
Sanderson & Porter
Sangster & Co., A.
Stevens & Wood, Inc.
Stone & Webster
White Eng. Corp., The J. G.
Wortham, Edwin

Engines, Gas, Oil or Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

Extension Platform Trap Doors
Edwards Co., Inc., O. M.

Fare Boxes
Cleveland Fare Box Co.
Economy Elec. Devices Co.
Nat'l Ry. Appliance Co.

Fences, Woven Wire and Fence Posts
Amer. Steel & Wire Co

Fenders and Wheel Guards
Brill Co., The J. G.
Consolidated Car Fender Co.
Elec. Service Supplies Co.
St. Louis Car Co.
Star Brass Works

Fibre and Fibre Tubing
Westinghouse E. & M. Co.

Field Coils (See Coils)

Fire Extinguishers
Foamite-Childs Co.

Fire Fighting Devices
Foamite-Childs Co.

Flangeway Guards, Steel
Godwin Co., Inc., W. S.

Flaxlinum Insulation
Nat'l Ry. Appliance Co.

Floodlights
Elec. Service Supplies Co.

Forgings
Carnegie Steel Co.
Columbia M. W. & M. I. Co.

Frogs & Crossings, Tee Rail
Ramapo Ajax Corp.

Frogs, Track (See Track Work)

Frogs, Trolley
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.

Funnel Castings
Wharton, Jr., Inc., & Co. Wm.

Furnace, Electric
Pittsburgh Elec. Furnace Corp.

Furniture, Metal Office
Edwards Co., Inc., O. M.

Fuses and Fuse Boxes
Columbia M. W. & M. I. Co
Consolidated Car Heati'g Co
General Electric Co.
Westinghouse E. & M. Co.

Fuses, Refillable
Columbia M. W. & M. I. Co.
General Electric Co.

Gaskets
Westinghouse Tr. Br. Co.

Gas-Electric Cars
General Electric Co.

Gas Producers
Westinghouse E. & M. Co.

Gates, Car
Brill Co., The J. G.
St. Louis Car Co.

Gear Blanks
Carnegie Steel Co.

Gear Cases
Chillingworth Mfg. Co.
Columbia M. W. & M. I. Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Gears and Pinions
Bemis Car Truck Co.
Columbia M. W. & M. I. Co
Elec. Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
General Electric Co.

Generators
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co

Girder Rails
Lorain Steel Co.

Gong (See Bells and Gongs)

Greases (See Lubricants)

Grinders and Grind. Supplies
Railway Track-work Co.

Grinders, Portable
Railway Track-work Co.

Grinders, Portable Electric
Railway Track-work Co.
Seymour Rail Grinder Co.

Grinding Blocks and Wheels
Railway Track-work Co.

Guard Rail Clamps
Ramapo Ajax Corp.

Guard Rails, Tee Rail & Manganese
Ramapo Ajax Corp.

Guards, Cattle
American Bridge Co.

Guards, Trolley
Elec. Service Sup. Co.
Ohio Brass Co.

Hammers Pneumatic
Ingersoll-Rand Co.

Harps, Trolley
Anderson Mfg. Co., A & J. M.
Elec. Service Supplies Co.
Nuttall Co., R. D.
Star Brass Works
Thornton Trolley Wheel Co

Headlights
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.

Headlining
Pantasote Co., The

Heaters, Car (Electric)
Consolidated Car Heati'g Co
Economy Elec. Devices Co.
Gold Car Heat. & Light. Co
Nat'l Ry Appliance Co., P.
Smith Heater Co., Peter

Helmets—Welding
Railway Track-work Co.

Heaters, Car, Hot Air and Water
Elec. Service Sup. Co.
Smith Heater Co., Peter

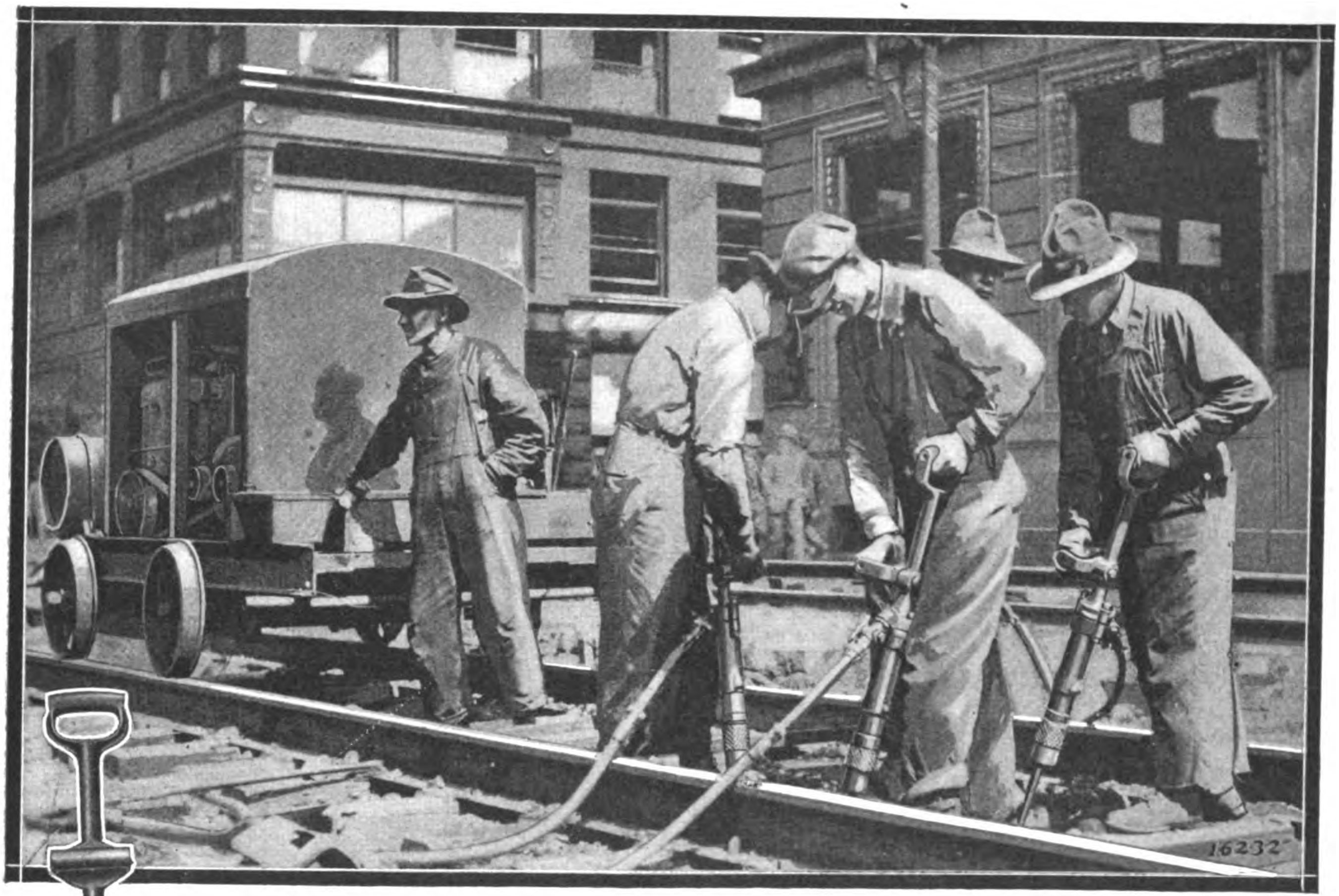
Hoists and Lifts
Columbia M. W. & M. I. Co
Ford Chain Block Co.

Hoists, Portable
Ingersoll-Rand Co.

Hydraulic Machinery
Allis-Chalmers Mfg. Co.

Indicating Signals
Oskel Equipment Co

Instruments Measuring, Testing and Recording
Economy Elec. Devices Co.
Elec. Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co



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Enable small gangs to equal the work output of large ones

A five man gang with I-R Pneumatic Tampers will tamp more track and do a better job than sixteen men hand tamping.

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- **Insulating Cloth, Paper and Tape**
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  - Irvington Varnish & Ins. Co.
  - Mica Insulator Co.
  - Okonite Co.
  - Stand. Underground Cable Co.
  - Westinghouse E. & M. Co.
- **Insulating Silk**
  - Irvington Varnish & Ins. Co.
- **Insulating Varnishes**
  - Irvington Varnish & Ins. Co.
- **Insulation (See also Paints)**
  - Anderson, M. Co., A. & J. M.
  - Electric Ry. Equiptmt. Co.
  - Electric Service Sup. Co.
  - General Electric Co.
  - Irvington Varnish & Ins. Co.
  - Mica Insulator Co.
  - Okonite Co.
  - Westinghouse E. & M. Co.
- **Insulators (see also Line Material)**
  - Anderson, M. Co., A. & J. M.
  - Elec. Ry. Equipment Co.
  - Elec. Service Supplies Co.
  - General Electric Co.
  - Hemingray Glass Co.
  - Irvington Varnish & Ins. Co.
  - Ohio Brass Co.
  - Westinghouse E. & M. Co.
- **Insulator Pins**
  - Elec. Service Supplies Co.
  - Hubbard & Co.
- **Insulators, High Voltage**
  - Lapp Insulator Co., Inc.
- **Insurance**
  - Travelers Insurance Co.
- **Jacks (See also Cranes, Hoists and Lifts)**
  - Elec. Service Supplies Co.
- **Joints, Rail**
  - (See Rail Joints)
- **Journal Boxes**
  - Bemis Car Truck Co.
  - Brill Co., J. G.
  - St. Louis Car Co.
  - Symington Co., The T. H.
- **Junction Boxes**
  - Std. Underground Cable Co.
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  - Anderson M. Co., A. & J. M.
  - Elec. Service Sup. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Lamps, Arc & Incandescent (See also Headlights)**
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Lamps, Signal and Marker**
  - Nichols-Lintern Co.
- **Lanterns, Classification**
  - Nichols-Lintern Co.
- **Lighning Protection**
  - Elec. Service Sup. Co.
  - General Electric Co.
  - Ohio Brass Co.
  - Shaw, Henry M.
  - Westinghouse E. & M. Co.
- **Line Material (See also Brackets, Insulators, Wires, etc.)**
  - Anderson, M. Co., A. & J. M.
  - Archbold-Brady Co.
  - Columbia M. W. & M. I. Co.
  - Electric Ry. Equipmt. Co.
  - Elec. Service Sup. Co.
  - Hubbard & Co.
  - Ohio Brass Co.
  - Westinghouse E. & M. Co.
- **Locking Spring Boxes**
  - Wharton Jr., & Co., Wm.
- **Locomotives, Electric**
  - Baldwin Locomotive Works
  - General Electric Co.
  - St. Louis Car Co.
  - Westinghouse E. & M. Co.
- **Lockers, Metal**
  - Edwards Co., Inc., O. M.
- **Lubricating Engineers**
  - Galena Signal Oil Co.
  - Texas Co.
  - Universal Lubricating Co.
- **Lubricants, Oil and Grease**
  - Galena Signal Co.
  - Texas Co.
  - Universal Lubricating Co.
- **Machine Tools**
  - Columbia M. W. & M. I. Co.
- **Machine Work**
  - Columbia M. W. & M. I. Co.
- **Machinery, Insulating**
  - Amer. Insulating Mach. Co.
- **Manganese Steel Castings**
  - Wharton, Jr., & Co., Wm.
- **Manganese Steel Guard Rails**
  - Ramapo Ajax Corp.
- **Manganese Steel Switches Frogs & Crossings**
  - Ramapo Ajax Corp.
- **Manganese Steel Special Track Work**
  - Wharton, Jr., & Co., Wm.
- **Meters (See Instruments)**
- **Mica**
  - Mica Insulator Co.
- **Molding, Metal**
  - Allis-Chalmers Mfg. Co.
- **Motor Buses (See Buses, Motor)**
- **Motors, Electric**
  - Westinghouse E. & M. Co.
- **Motors and Generators, Sets**
  - General Electric Co.
- **Motormen's Seats**
  - Allis-Chalmers Mfg. Co.
  - Brill Co., J. G.
  - Elec. Service Sup. Co.
  - Hale-Kilburn Co.
  - Heywood-Wakefield Co.
  - St. Louis Car Co.
  - Wood Co., Chas. N.
- **Nuts and Bolts**
  - Barbour-Stockwell Co.
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
  - Hubbard & Co.
- **Oils (See Lubricants),**
- **Omnibuses (See Buses, Motor)**
- **Oxy-Acetylene (See Cutting Apparatus Oxy-Acetylene)**
- **Paint Guns**
  - De Vilbiss Mfg. Co.
- **Paint Spraying Devices**
  - De Vilbiss Mfg. Co.
- **Paints and Varnishes (Insulating)**
  - Mica Insulator Co.
- **Paints & Varnishes, Preservative**
  - Beckwith-Chandler Co.
- **Paints and Varnishes for Woodwork**
  - Beckwith-Chandler Co.
  - National Ry. Appliance Co.
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  - Ingersoll-Rand Co.
- **Paving Brick, Vitrified**
  - Nat'l Brick Pav. Mfrs. Assc.
- **Paving Guards, Steel**
  - Godwin Co., Inc., W. S.
- **Paving Material**
  - Amer. Br. Shoe & Fdy. Co.
- **Pickups, Trolley Wire**
  - Elec. Service Supplies Co.
  - Ohio Brass Co.
- **Pinion Pullers**
  - Columbia M. W. & M. I. Co.
  - Elec. Service Supplies Co.
  - General Electric Co.
  - Wood Co., Chas. N.
- **Pinions (See Gears)**
- **Pins, Case Hardened, Wood and Iron**
  - Bemis Car Truck Co.
  - Elec. Service Sup. Co.
  - Ohio Brass Co.
  - Westinghouse Tr. Brake Co.
- **Pipe Fittings**
  - **Power Specialty Co.**
  - Westinghouse Tr. Brake Co.
- **Planers (See Machine Tools)**
- **Plates for Tee Rail Switches**
  - Ramapo Ajax Corp.
- **Pliers, Rubber Insulated**
  - Elec. Service Sup. Co.
- **Pneumatic Tools**
  - Ingersoll-Rand Co.
- **Pole Line Hardware**
  - Ohio Brass Co.
- **Poles, Metal Street**
  - Bates Exp. Steel Truss Co.
  - Elec. Ry. Equipmt. Co.
  - Hubbard & Co.
  - Western Electric Co.
- **Pole Reinforcing**
  - Hubbard & Co.
- **Poles & Ties Treated**
  - Baker Wood Preserving Co.
  - International Creosoting & Construction Co.
- **Poles, Ties, Posts, Piling & Lumber**
  - Baker Wood Preserving Co.
  - Bell Lumber Co.
  - International Creosoting & Construction Co.
- **Poles, Trolley**
  - Anderson Mfg. Co., A. & J. M.
  - Bell Lumber Co.
  - Columbia M. W. & M. I. Co.
  - Elec. Service Supplies Co.
  - Nuttall Co., R. D.
- **Poles, Tubular Steel**
  - Elec. Ry. Equipmt. Co.
  - Elec. Service Sup. Co.
- **Porcelain, Special High Voltage**
  - Lapp Insulator Co., Inc.
- **Potheads**
  - Okonite Co.
- **Power Saving Devices**
  - Economy Elec. Devices Co.
  - National Ry. Appliance Co.
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  - General Electric Co.
  - Westinghouse E. & M. Co.
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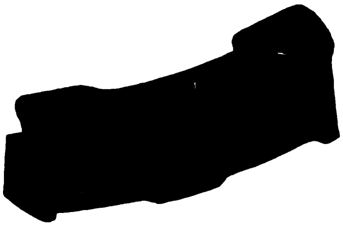
  - Allis-Chalmers Mfg. Co.
  - Ingersoll-Rand Co.
- **Pumps, Vacuum**
  - Ingersoll-Rand Co.
- **Punches, Ticket**
  - Bonney-Vehslage Tool Co.
  - Intern'l Register Co., The
  - Wood Co., Chas. N.
- **Rail Braces & Fastenings**
  - Ramapo Ajax Corp.
- **Rail Grinders (See Grinders)**
- **Rail Joints**
  - Carnegie Steel Co.
- **Rail Joints—Welded**
  - Lorain Steel Co.
- **Rails, Steel**
  - Carnegie Steel Co.
- **Railway Paving Guards, Steel**
  - Godwin Co., Inc., W. S.
- **Railway Safety Switches**
  - Consolidated Car Heat. Co.
  - Westinghouse E. & M. Co.
- **Rail Welding**
  - Railway Track-work Co.
  - Rail Welding & Bonding Co.
- **Rattan**
  - Amer. Rattan & Reed Mfg. Co.
  - Brill Co., The J. G.
  - Elec. Service Supplies Co.
  - Hale-Kilburn Co.
  - Heywood-Wakefield Co.
  - St. Louis Car Co.
- **Reclaimers, Waste & Oil**
  - Oil & Waste Saving Mch. Co.
- **Registers and Fittings**
  - Brill Co., The J. G.
  - Elec. Service Supplies Co.
  - Intern'l Register Co., The
  - Rooke Automatic Register Co.
  - St. Louis Car Co.
- **Reinforcement, Concrete**
  - Amer. Steel & Wire Co.
  - Carnegie Steel Co.
- **Repair Shop Appliances (See also Coil Banding and Winding Machines)**
  - Columbia M. W. & M. I. Co.
  - Elec. Service Supplies Co.
- **Repair Work (See also Coils)**
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Replacers, Car**
  - Columbia M. W. & M. I. Co.
  - Elec. Service Sup. Co.
- **Resistances**
  - Consolidated Car Heat. Co.
- **Resistance, Grid**
  - Columbia M. W. & M. I. Co.
- **Resistance, Wire and Tube**
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Retrievers, Trolley (See Catchers and Retrievers, Trolley)**
- **Rheostats**
  - General Electric Co.
  - Mica Insulator Co.
  - Westinghouse E. & M. Co.
- **Roofing, Car**
  - Pantasote Co., The
- **Sanders, Track**
  - Brill Co., The J. G.
  - Columbia M. W. & M. I. Co.
  - Elec. Service Sup. Co.
  - Nichols-Lintern Co.
  - Ohio Brass Co.
  - St. Louis Car Co.
- **Sash Fixtures, Car**
  - Brill Co., The J. G.
  - Edwards Co., Inc., O. M.
  - St. Louis Car Co.
- **Sash, Metal, Car Window**
  - Hale-Kilburn Co.
- **Scrapers, Track (See Cleaners and Scrapers, Track)**
- **Screw Drivers, Rubber Insulated**
  - Elec. Service Sup. Co.
- **Seats, Bus**
  - St. Louis Car Co.
- **Seats, Car (See also Rattan)**
  - Amer. Rattan & Reed Mfg. Co.
  - Brill Co., The J. G.
  - Hale-Kilburn Co.
  - Heywood-Wakefield Co.
  - St. Louis Car Co.
- **Seating Materials**
  - Brill Co., J. G.
  - Heywood-Wakefield Co.
  - Pantasote Co., The
  - St. Louis Car Co.
- **Second Hand Equipment**
  - Electric Equipment Co.
  - Indiana Service Corp.
  - Hyman, Michaels
  - Transit Equip. Co.
  - Zelnick Supply Co., W. A.
- **Shades, Vestibule**
  - Brill Co., The J. G.
- **Shovels**
  - Allis-Chalmers Mfg. Co.
  - Brill Co., The J. G.
  - Hubbard & Co.
- **Side Bearings (See Bearings, Center and Side)**
- **Signals, Car Starting**
  - Consolidated Car Heat. Co.
  - Elec. Service Sup. Co.
  - Nat'l Pneumatic Co., Inc.
- **Signals, Indicating**
  - Nichols-Lintern Co.
  - Oskel Equipment Co.
- **Signal Systems, Block**
  - Elec. Service Sup. Co.
  - Nachod Signal Co., Inc.
  - U. S. Elec. Signal Co.
  - Wood Co., Chas. N.
- **Signal Systems, Highway Crossing**
  - Nachod Signal Co., Inc.
  - U. S. Elec. Signal Co.
- **Slack Adjusters (See Brake Adjusters)**
- **Slag**
  - Carnegie Steel Co.
- **Sleet Wheels and Cutters**
  - Anderson Mfg. Co., A. & J. M.
  - Columbia M. W. & M. I. Co.
  - Elec. Ry. Improvement Co.
  - Elec. Service Supplies Co.
  - Nuttall Co., R. D.
- **Smokestacks, Car**
  - Nichols-Lintern Co.
- **Snow Sweepers, Rattan**
  - **Heywood-Wakefield Co.**
- **Snow-Plows, Sweepers and Brooms**
  - Amer. Rattan & Reed Mfg. Co.
  - Brill Co., The J. G.
  - Columbia M. W. & M. I. Co.
  - Consolidated Car Fender Co.
  - St. Louis Car Co.
- **Soldering and Brazing Apparatus (See Welding Processes and Apparatus)**
  - Irvington Varnish & Ins. Co.
- **Special Trackwork**
  - Lorain Steel Co.
- **Spikes**
  - Amer. Steel & Wire Co.
- **Splicing Compounds**
  - Westinghouse E. & M. Co.
- **Splicing Sleeves (See Clamps and Connectors)**
- **Springs, Car and Truck**
  - Amer. Steel & Wire Co.
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
  - St. Louis Car Co.
- **Sprinklers, Track and Road**
  - Brill Co., The J. G.
  - St. Louis Car Co.
- **Steps, Car**
  - Universal Safety Tread Co.
- **Steel Castings**
  - Wharton, Jr., & Co., Wm.
- **Steel and Steel Products**
  - Morton Mfg. Co.
- **Steps, Car**
  - Morton Mfg. Co.
  - Universal Safety Tread Co.
- **Stokers, Mechanical**
  - Babcock & Wilcox Co.
  - Westinghouse E. & M. Co.
- **Stop Signals**
  - Oskel Equipment Co.
- **Storage Batteries (See Batteries, Storage)**
- **Strain, Insulators**
  - Anderson Mfg. Co., A. & J.M.
  - Ohio Brass Co.
- **Strand**
  - Roebling's Sons Co., J. A.
- **Superheaters**
  - Babcock & Wilcox Co.
- **Sweepers, Snow (See Snow Plows, Sweepers and Brooms)**
- **Switch Stands & Fixtures**
  - Ramapo Ajax Corp.
- **Switches, Selector**
  - Nichols-Lintern Co.
- **Switches, Tee Rail**
  - Ramapo Ajax Corp.
- **Switches, Track (See Track Special Work)**
- **Switches and Switchboards**
  - Allis-Chalmers Mfg. Co
  - Anderson Mfg. Co., A. J. & J. M.
  - Elec. Service Supplies Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Tamper Tie**
  - Ingersoll-Rand Co.
  - Railway Track-work Co.
- **Tapes and Cloths (See Insulating Cloth, Paper and Tape)**
- **Tee Rail Special Track Work**
  - Ramapo Ajax Corp.
- **Telephones and Parts**
  - Elec. Service Supplies Co.
- **Terminals, Cable**
  - Std. Underground Cable Co.
- **Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)**
- **Thermostats**
  - Consolidated Car Heat. Co.
  - Gold Car Heating & Lighting Co.
  - Railway Utility Co.
  - Smith Heater Co., Peter
- **Ticket Choppers & Destroyers**
  - Elec. Service Supplies Co.
- **Tires, All Metal**
  - Metal Safety R. R. Tie Co.
- **Ties and Tie Rods, Steel**
  - American Bridge Co.
  - Barbour-Stockwell Co.
  - Carnegie Steel Co.
  - International Steel Tie Co.
- **Ties, Wood Cross (See Poles, Ties, Posts, etc.)**
- **Tongue Switches**
  - Wharton, Jr., & Co., Wm.
- **Tool Steel**
  - Carnegie Steel Co.
- **Tools, Track & Miscellaneous**
  - Amer. Steel & Wire Co.
  - Columbia M. W. & M. I. Co.
  - Elec. Service Supplies Co.
  - Hubbard & Co.
  - Railway Track-work Co.
- **Torches, Acetylene (See Cutting Apparatus)**
- **Tower Wagons and Auto Trucks**
  - McCardell & Co., J. R.
- **Towers and Transmission Structures**
  - Archbold-Brady Co.
  - Bates Exp. Steel Truss Co.
  - Westinghouse E. & M. Co.
- **Track Expansion Joints**
  - Wharton, Jr., & Co., Inc., Wm.
- **Track Grinders**
  - Railway Track-work Co.
  - Rail Welding & Bonding Co.
  - Seymour Rail Grinder Co.
- **Trackless Trolley Cars**
  - St. Louis Car Co.
- **Track, Special Work**
  - Barbour-Stockwell Co.
  - New York Switch and Crossing Co.
  - Ramapo Ajax Corp.
  - Wharton, Jr. & Co., Inc., W.
- **Transfer (See Tickets)**
- **Transfer Tables**
  - American Bridge Co.
- **Transformers**
  - Allis-Chalmers Mfg. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Treads, Safety, Stair, Car Step**
  - Morton Mfg. Co.
  - Universal Safety Tread Co.
- **Trolley Bases**
  - Anderson Mfg. Co., A. J. & J. M.
  - Elec. Service Supplies Co.
  - General Electric Co.
  - Nuttall Co., R. D.
  - Ohio Brass Co.
- **Trolley Bases, Retrieving**
  - Anderson Mfg. Co., A. & J. M.
  - Elec. Service Supplies Co.
  - Nuttall Co., R. D.
  - Ohio Brass Co.
- **Trolley Buses**
  - Brill Co., The J. G.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Trolley Material**
  - Anderson Mfg. Co., A. & J.M.
  - Ohio Brass Co.
  - Elec. Service Supplies Co.
- **Trolley Shoes**
  - Miller Trolley Shoe Co.
- **Trolley Wheels and Harps**
  - Thornton Trolley Wheel Co.
- **Trolleys and Trolley Systems**
  - Ford Chain Block Co.
- **Trolley Wheels (See Wheels, Trolley)**
- **Trolley Wire**
  - American Copper Products Corp.
  - Amer. Electrical Works
  - Amer. Steel & Wire Co.
  - Anaconda Copper Min. Co.
  - Page Steel & Wire Co.
  - Roebling's Sons Co., J. A.
  - Thornton Trolley Wheel Co.
  - Western Electric Co.
- **Truck, Car**
  - Baldwin Locomotive Works
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
  - St. Louis Car Co.
- **Tubing Yellow & Black Flexible Varnish**
  - Irvington Varnish & Ins. Co.
- **Turbines, Steam**
  - Allis-Chalmers Mfg. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Turnstiles**
  - Elec. Service Supplies Co.
  - Perey Mfg. Co., Inc.
- **Upholstery Materials**
  - Amer. Rattan & Reed Mfg. Co.
- **Valves**
  - Ohio Brass Co.
  - Westinghouse Tr. Br. Co.
- **Varnished Papers**
  - Irvington Varnish & Ins. Co.
- **Varnished Silk**
  - Irvington Varnish & Ins. Co.
- **Varnishes**
  - Beckwith Chandler Co.
- **Ventilators, Car**
  - Brill Co., The J. G.
  - Nat'l Ry. Appliance Co.
  - Nichols Lintern Co.
  - Railway Utility Co.
  - St. Louis Car Co.
- **Waste Saving Machine**
  - Oil & Waste Saving Mach Co.
- **Welded Rail Joints**
  - Alumino-Thermic Corp.
  - Ohio Brass Co.
  - Railway Track-work Co.
  - Rail Welding & Bonding Co.
- **Welders, Portable Electric**
  - Elec. Ry. Improvement Co.
  - Ohio Brass Co.
  - Railway Track-work Co.
  - Rail Welding & Bonding Co.
  - Seymour Rail Grinder Co.
- **Welding Wire & Rods**
  - Page Steel & Wire Co.
- **Welding Processes and Apparatus**
  - Alumino-Thermic Corp.
  - Elec. Ry. Improvement Co.
  - General Electric Co.
  - Green Equip. Co.
  - International Oxygen Co.

Brake Shoes
A.E.R.A. Standards

Diamond "S" Steel Back is the Best Type

Standard Patterns for

SAFETY CAR



D-67 for Narrow Treads
D-87 for Wide Treads

American Brake Shoe and Foundry Co.
30 Church Street, New York
332 So. Michigan Ave., Chicago Chattanooga, Tenn.

You're having brush trouble

CORRECT IT
USE LE CARBONE CARBON BRUSHES

They talk for themselves

COST MORE PER BRUSH
COST LESS PER CAR MILE

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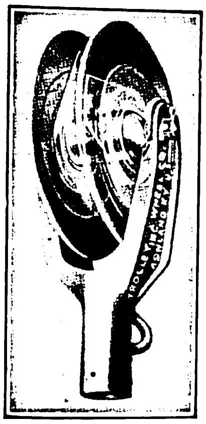
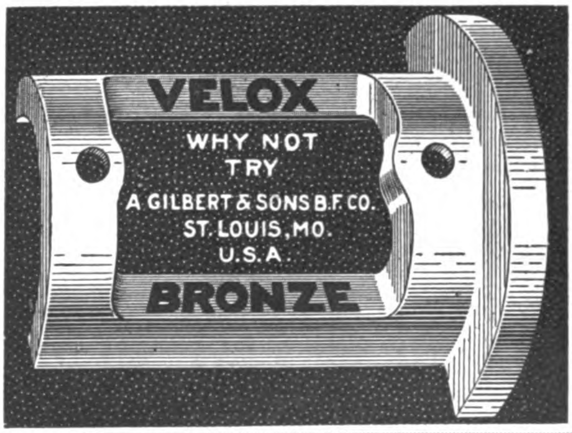


Tests Prove That Fewer Inspections Are Required

This fact about the Thornton Side Bearing Trolley Wheel is due to the method of lubrication and the extremely long life of the bearings. The construction insures a perfectly balanced wheel and freedom from vibration and noise. Users are getting over 50,000 miles from the side bearings. Write for Bulletin.

Thornton Trolley Wheel Co.
Incorporated
Ashland, Kentucky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A GILBERT & SONS B.F. CO.
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A LUBRICANT

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We solicit a test of TULC
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The Universal Lubricating Co.
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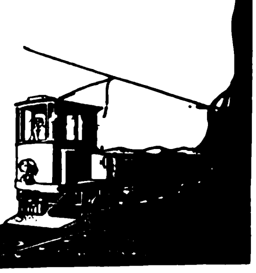
The Differential Car

An automatic dump car, an electric locomotive, a snow plow, and a freight car—all in one. Big savings shown in track construction and maintenance, paving work, coal hauling, ash disposal, snow removal, and freight transportation.

The Differential Steel Car Co.
Findlay, Ohio



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'CARNEGIE'
When you think of Steel—think of Carnegie

Northern CEDAR POLES Western
We guarantee
all grades of poles; also any butt-treating specifications
BELL LUMBER COMPANY
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The Stop Light for street cars. Operates from brake system. Details on request
The Oskel Equipment Co.
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OXYGEN
FOR CUTTING, WELDING, ETC.
INTERNATIONAL OXYGEN COMPANY
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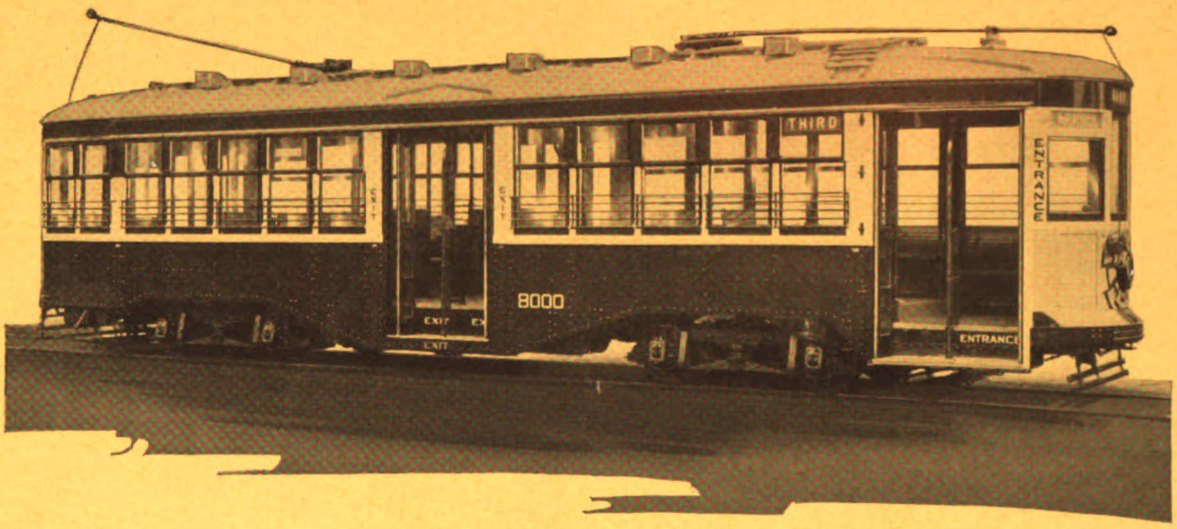
BROOKLYN

New Cars of Front-Entrance "Pay-as-you-pass" Center-Exit Type



Brill 77-E-1 Trucks, equipped with 26-in. diameter wheels.

Length over corner posts	**30 ft., 7½ in.**
Length over anti-climbers	**44 ft., 2 in.**
Extreme width	**8 ft., 2¼ in.**
Seating capacity	**47**

One hundred double-end, front-entrance center-exit cars mounted on Brill 77-E-1 trucks, 5 ft. 4 in. wheelbase, are now being delivered to the Brooklyn City Railroad Company.

Included in the equipment of these cars are four 35 hp. motors, complete safety devices and variable load brakes. They are arranged for one-man, two-man operation, and maximum seating capacity is obtained by the use of movable seats across the door openings. These seats fold into pockets dividing the door openings and separating incoming and outgoing passengers. All transverse seats are of Brill "Winner" type.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.
AMERICAN CAR CO. — ST. LOUIS MO. — G. C. KUHLMAN CAR CO. — CLEVELAND, OHIO. — WASON MANF'G CO. — SPRINGFIELD, MASS.

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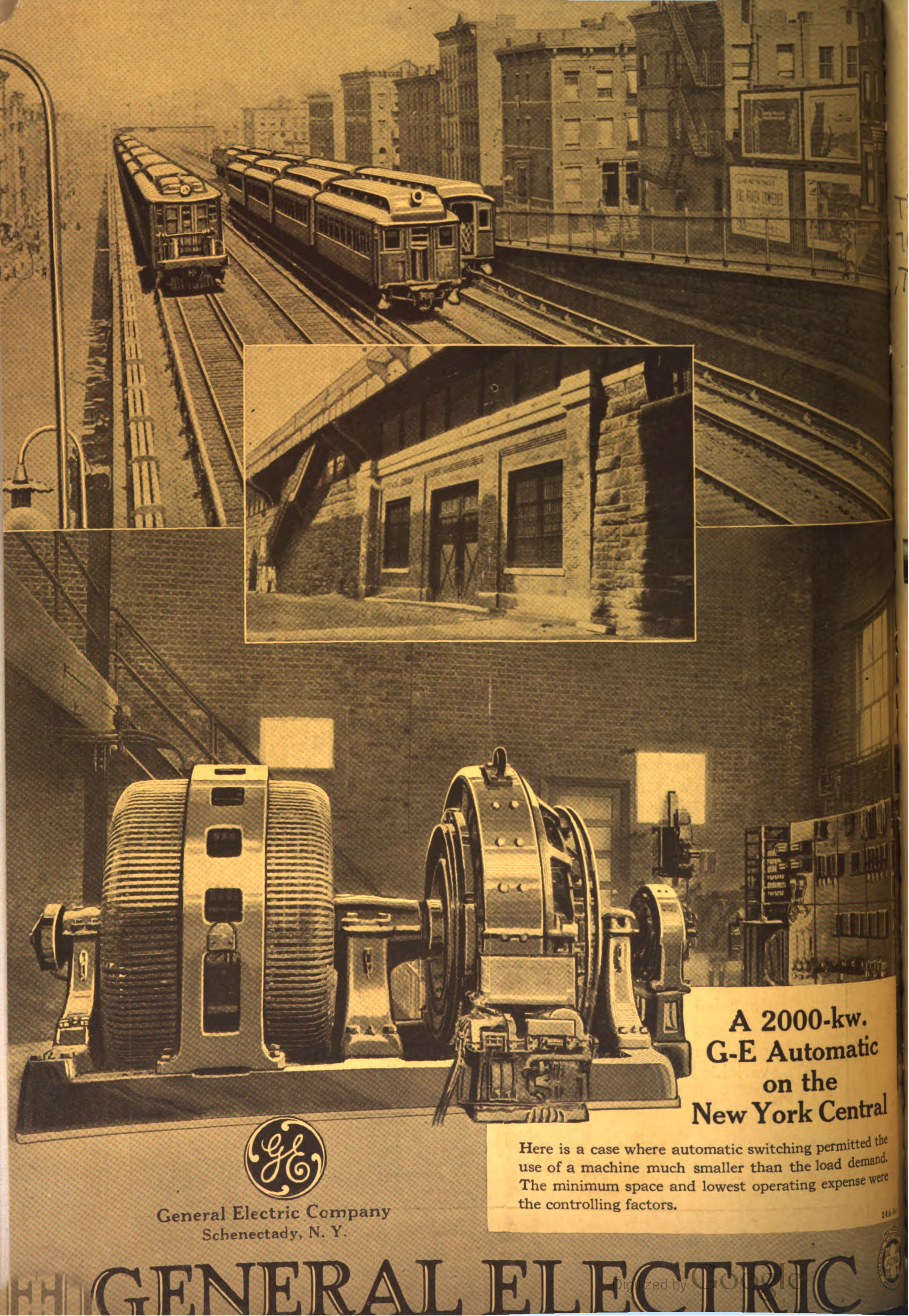

A 2000-kw. G-E Automatic on the New York Central

Here is a case where automatic switching permitted the use of a machine much smaller than the load demand. The minimum space and lowest operating expense were the controlling factors.

54A-84

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Schenectady, N. Y.

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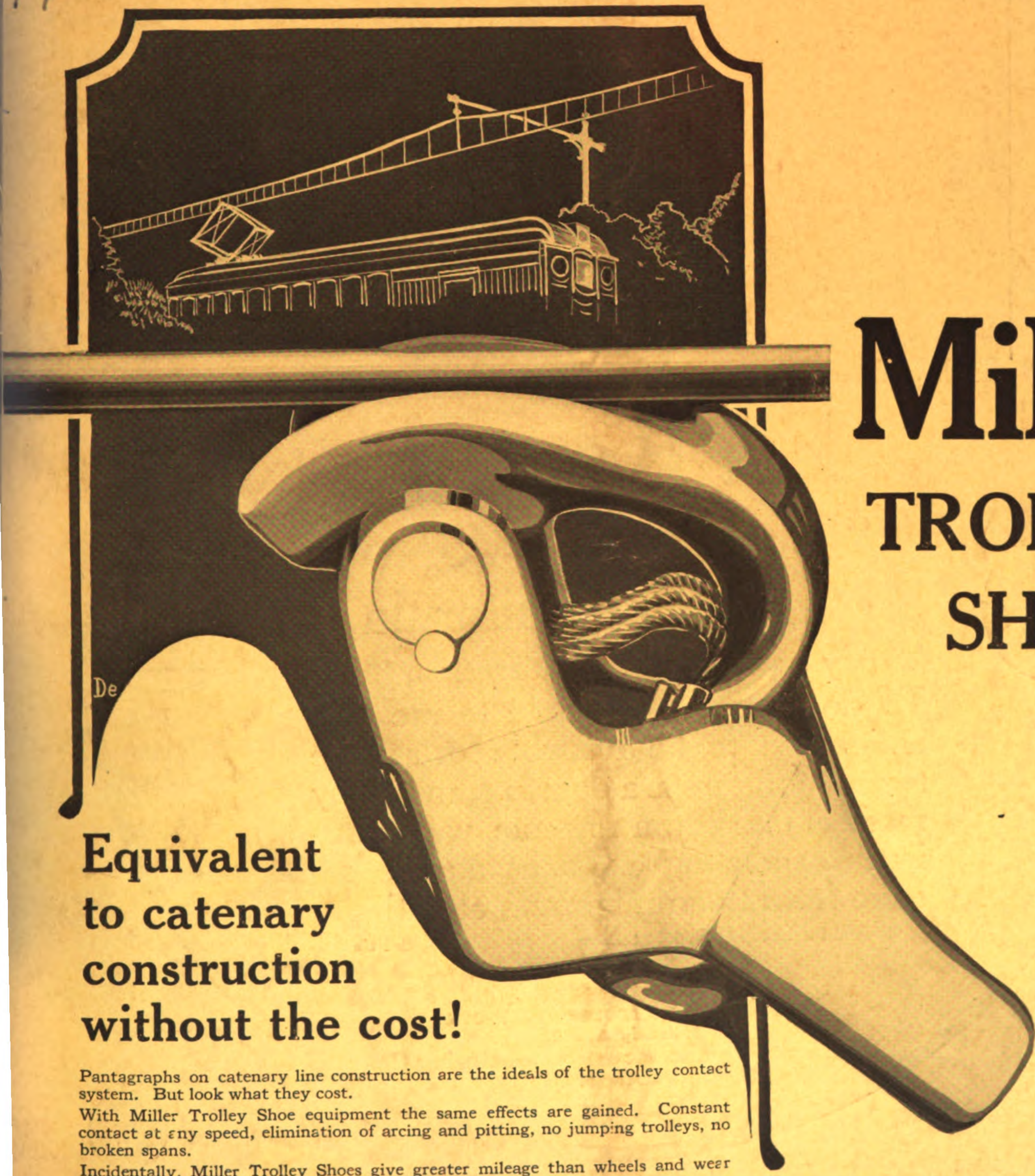

Miller
TROLLEY SHOE

Equivalent to catenary construction without the cost!

Pantagraphs on catenary line construction are the ideals of the trolley contact system. But look what they cost.

With Miller Trolley Shoe equipment the same effects are gained. Constant contact at any speed, elimination of arcing and pitting, no jumping trolleys, no broken spans.

Incidentally, Miller Trolley Shoes give greater mileage than wheels and wear the wire less.

Solve trolley contact problems with

Miller Trolley Shoes

MILLER TROLLEY SHOE COMPANY
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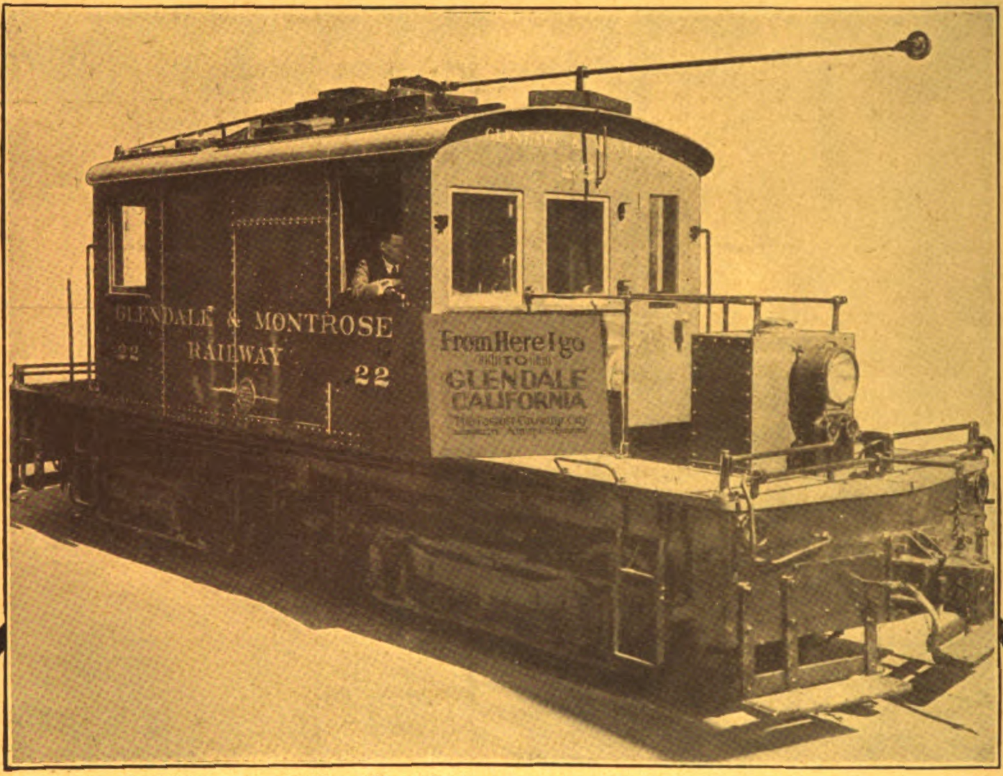

Baldwin Westinghouse 50-Ton Class B Locomotive, A.E.R.A. Convention, October 1923

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"From here I go to Glendale, California,"

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Special Publication No. 1034 tells more about my capabilities Send for it

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Philadelphia, Pa.
Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.

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Vol. 62, *No.* 21 New York, November 24, 1923 *Pages* 885-924

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For outlying sections, with track on surface, commission engineer declares cost about same as elevated and one-third that of subway.

Remodeling a Power Plant to Improve Performance 893
Batavia station of C., A. & E. R.R., twenty-two years old, with changes costing $11 per kilowatt, has 12 per cent lower water rate and 30 per cent less maintenance. Capacity also is increased about 10 per cent.

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How One Railway Puts the "Journal" to Good Use

AN IDEA set forth in the pages of ELECTRIC RAILWAY JOURNAL was quickly taken advantage of by a railway executive who writes to us under date of November 21, as follows:

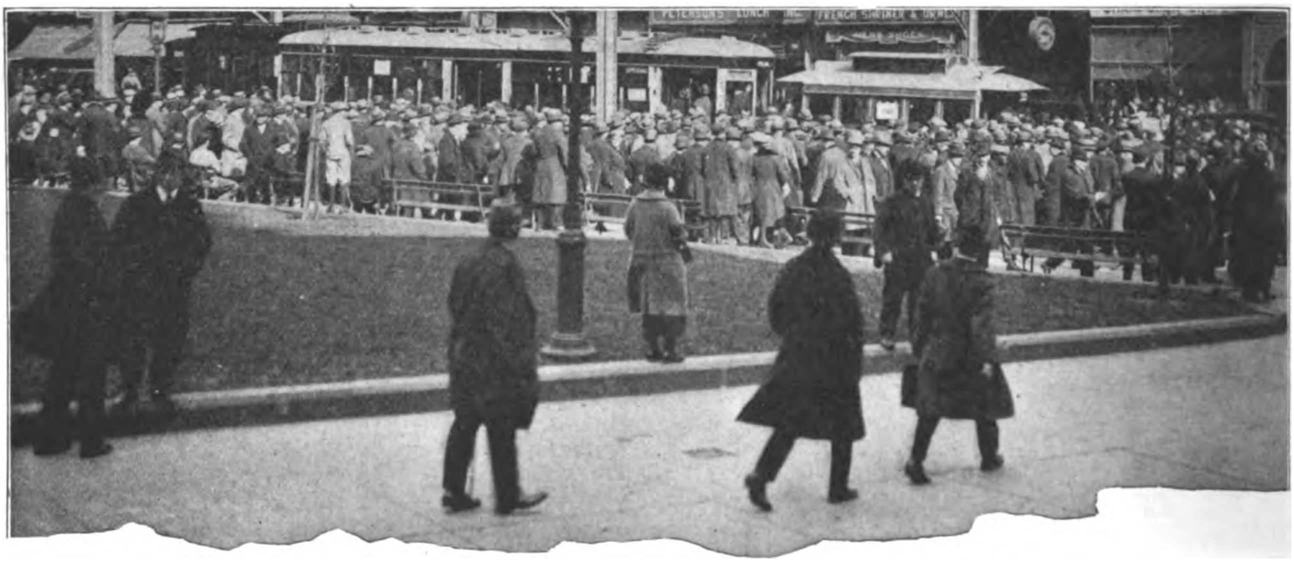
> "You may remember your leading editorial in the JOURNAL week before last, 'A Basis for Getting Merchants to Accept Traffic Regulation.' I took a copy of this to the *Morning Sun* last Wednesday night, and on Thursday morning they printed it on the editorial page, as you will see by the copy that I am mailing you today. The editor had no hesitation at all when I offered it to him and seemed very glad to get it, which is pretty good evidence of his feeling toward the ELECTRIC RAILWAY JOURNAL and our company."

This editorial was later reprinted by that company in the form of a small four-page folder and mailed to all of the downtown merchants.

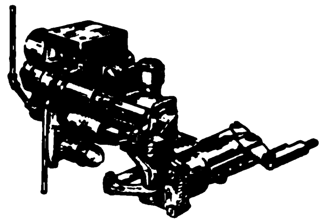
The JOURNAL frequently publishes matter with the idea in mind that it may form a helpful suggestion to the railways in advancing their local interests. Whether or not this aim is accomplished depends on the alertness of the railways in sensing the value of spreading the thought among the local people. The instance cited above is one example of putting the JOURNAL to effective use.

Number of Copies Printed, 5,925

Advertising Index—Alphabetical, 38; Classified, 34. 36; Searchlight Section, 33



When the first of the 200 new type cars was delivered to the Brooklyn City Railroad Company it was placed on exhibition near Brooklyn Borough Hall. Alongside it was shown an old horse-car which saw service in Brooklyn many years ago.



The Variable Load Brake Arrives in Brooklyn

The Westinghouse Variable Load Brake has arrived in Brooklyn with the delivery of the first of the 200 new type cars for the Brooklyn City Railroad Company.

The entire 200 cars, which are of the double-truck, light-weight, one-man, two-man type, will be equipped with the Variable Load Brake and are therefore of more than ordinary interest to all street railway men.

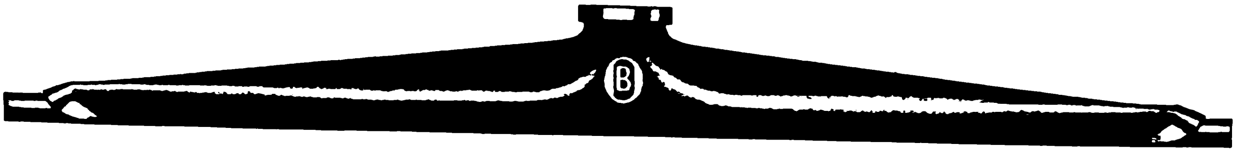
The Brooklyn City Railroad Company adopted the Variable Load Brake after a careful study of its traffic problems in order to determine how schedules could be speeded up. With this brake, the new cars will be stopped within the shortest possible distance, with minimum loss of time, and the stopping distance (or time) will NOT increase as the load increases.

The Variable Load Brake is not only safer, but in heavy traffic it is essential also as a time-saver and a revenue-builder.

Ask for
Publication
T-2045

Westinghouse Traction Brake Co.
General Office and Works: Wilmerding, Pa.

WESTINGHOUSE TRACTION BRAKES



This view of the New O-B Ear emphasizes the easy approach through special shaping of the tips and the symmetrical proportioning of the whole ear.

Get Acquainted with the new O-B Ear

FIVE Points of utility and worth guided its evolution. O-B experience was put into their development. Balanced in the Improved Ear, they offer you possibilities for exceptional service records.

Section of the ear at base when clinched on 2-0 wire. Note how the lips encircle and protect the wire.

Section of ear for 3-0 wire. Good wheel clearance and smooth passage for the trolley wheel are obvious.

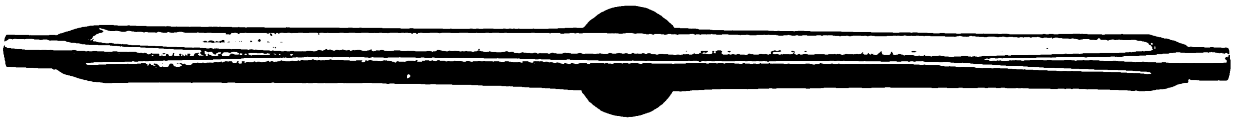
Section of ear for 4-0 wire. The same desirable features in the ears for smaller wire are evident. Plenty of metal for long life.

THE FIVE POINTS

1. Easy Approach—
   The lips are ground to a knife edge at the tips and left heavy at the center. The wheel comes onto the ear gradually thru this special shaping at the tips.
2. Smooth Underrun—
   The merging of the special tip design and heavier section of the lips at the center gives a clear passage for the wheel, with no bumps or depressions.
3. Protection to the Wire—
   Clear wheel passage and ample metal in the lips protect the trolley wire from wear or pounding. The wire lasts longer.
4. Correct Proportioning—
   Careful shaping has put plenty of bronze in the new ear just where it is needed most,—yet none for excessive weight or overbalancing.
5. Long Life—
   The combination of the four features outlined above with the well known characteristics of O-B Bronze, technically supervised in manufacture in the O-B Foundry, puts the *extra* life in this ear.

The Improved O-B Ear bears the responsibility of proving these values and the sincere effort and care put into their development. We think it will carry the responsibility!

You be the judge—Order now for trial



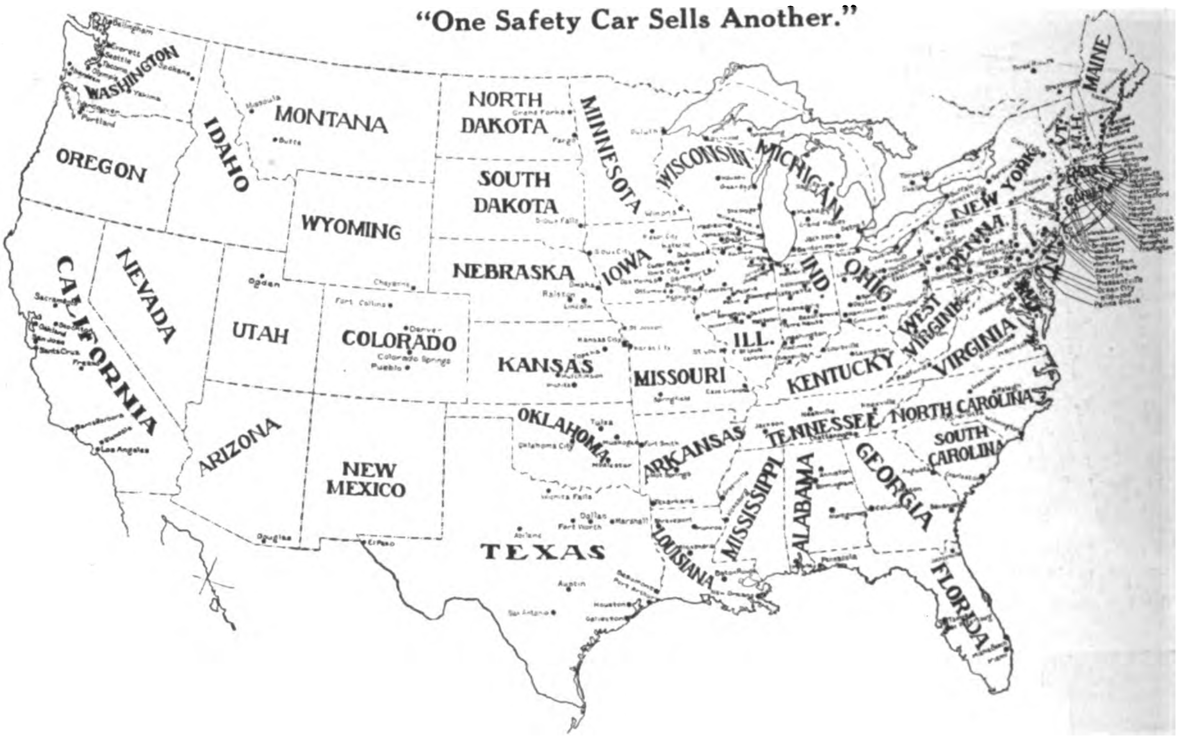
Underneath view of New O-B Ear. Note shaping of lips, how the easy approach is provided and excellent wheel clearance for entire length.

The Ohio Brass Co.
Mansfield, Ohio, U.S.A.

New York Philadelphia Pittsburgh Charleston, W. Va. Chicago Los Angeles San Francisco Paris, France

Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators

"One Safety Car Sells Another."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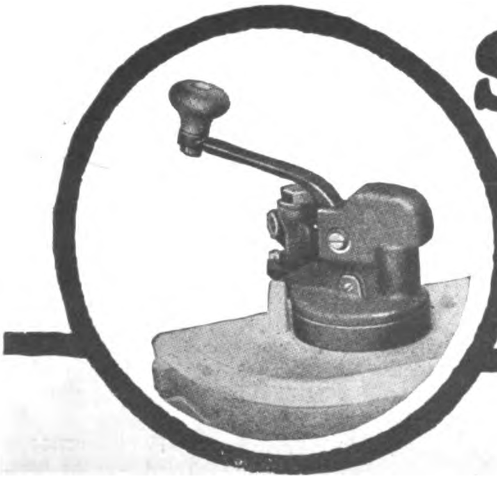
·Is Your Town Represented on the Safety Car Map?

THE accompanying map shows how well the Safety Car has succeeded.

Nobody any longer questions the advisability of turning to Safety Car operation wherever possible. The only question is, "On what basis—how many new cars or how many converted ones?"

We supply the standard Safety Devices which make any car a Safety Car. The map shows the cities in which more than 9,000 cars with our equipment are in service.



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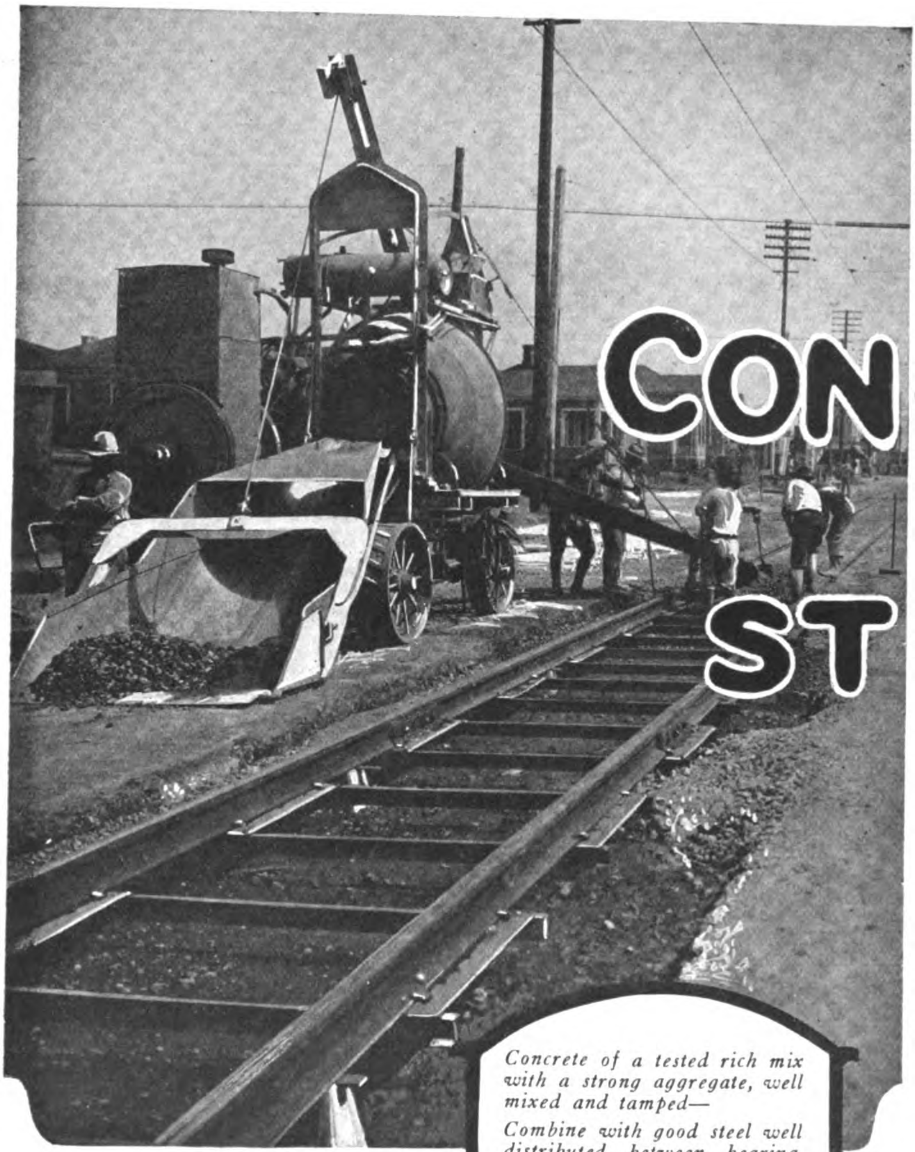


CONCRETE
STEEL

Concrete of a tested rich mix with a strong aggregate, well mixed and tamped—

Combine with good steel well distributed between bearing, reinforcement and tie members. These are the logical permanent materials for the foundation of the best paved track.

There is nothing in such construction to absorb water; to start cracks nor to rot and undermine the rail and joints.

When you hear that such construction is lower in first cost than wood tie construction, the rumor deserves intensive investigation.

Write, or wire, for prices definite shipping date, guaranteed freight rate, and folder on "Costs, Methods and Best Practice in Steel Tie Track Construction."

All Permanent Materials Make Long Lived Track

The International Steel Tie Company
Cleveland, Ohio

Canadian Representatives
Sarnia Bridge Company, Limited
Sarnia, Ontario

Steel Twin Tie Track

Mr. Steward says "Of Course"

At the New England Street Railway Club's meeting on October 25, Mr. H. M. Steward, superintendent of maintenance, Boston Elevated Railway made an address on track appliances and practice. He said this:

> "*Of course welding machines, grinders are used*"

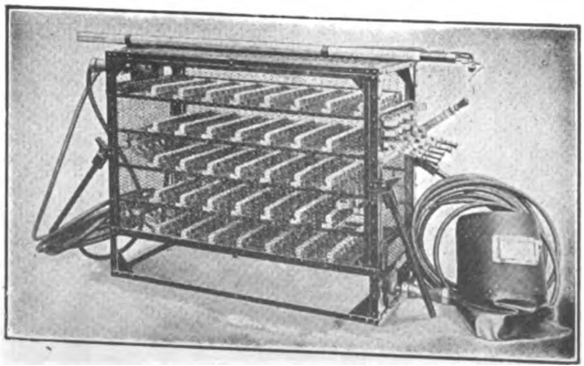
"Of course" the world's leading electric railway systems—including the Boston Elevated Railway, choose the welding and grinding equipment shown on this page.

Railway Trackwork Co.

3132-48 East Thompson Street, Philadelphia

AGENTS:

Chester F. Gailor, 30 Church St., New York; Chas. N. Wood Co., Boston; Electrical Engineering & Mfg. Co., Pittsburgh; P. W. Wood, New Orleans; Atlas Railway Supply Co., Chicago; Walter M. Graham, Toronto; Equipment & Engineering Co., London.



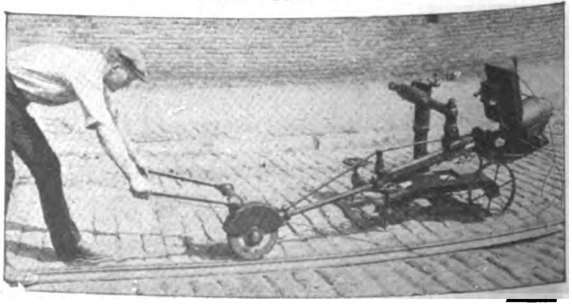
"Ajax" Electric Arc Welder

"Reciprocating" Track Grinder

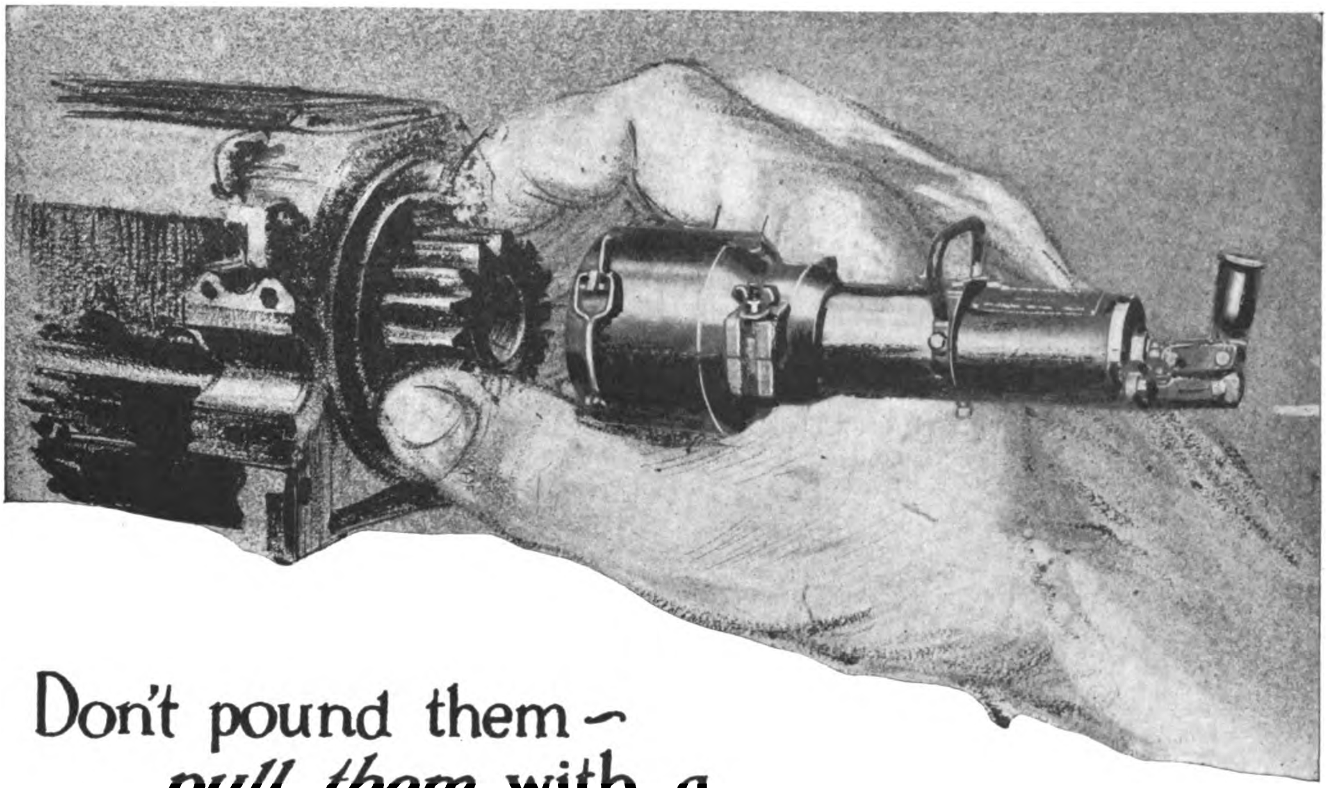
"Universal" Rotary Track Grinder

ATLAS RAIL GRINDER

"Atlas" Rail Grinder



"Hercules" Rail Grinder



Don't pound them— *pull them* with a Peerless Pinion Puller

Resistless yet harmless

So powerful that even the slightest man can pull the toughest pinion with a few strokes of the lever. So nicely fitted and so smooth in action that it will not even scratch or mar the pinion and shaft. It fits over the pinion and pulls in a straight line.

A one-man apparatus, functioning on the hydraulic power principle and using oil as the medium so that there is no danger of freezing. Weighs only 50 lbs.

It's easier, safer, quicker and cheaper to use the Peerless Portable Pinion Puller.

The price will interest you—write us

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L. J. Healing & Co., Ltd., Yokohama, Tokio, Kobe and Osaka, Japan.
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Here's How We
Accumulate Standard Specification Ties
for Your 1924 Requirements

THE International Tie Organization is composed of many thousand small producers who cut a few ties at a time, bring them to the siding and turn them over to our local agents.

International inspectors visit these producers at regular intervals to inspect, grade and pay cash for all the ties accepted. The strict enforcement of the A. R. E. A. Specifications is one of the outstanding features of International Tie Service which guarantees High Grade Standard Specification Ties at all times.

No International Ties are accepted for inspection when stacked closely—they must be piled openly so that any defect is detected.

Each International Inspector works with a helper and each tie is inspected for its entire length from both ends.

Each International Tie is inspected singly, the grade being marked on each tie with paint at the time the tie is accepted from the producer.

It will pay you to think of International not as an organization which sells to you, but as an organization which buys for you. You benefit by our all-year production and our strict and courageous inspection.

International
Treated Ties

Now is the time to contract for your 1924 requirements

International Creosoting & Construction Co.
General Office: Galveston, Texas
Plants: Texarkana, Texas Beaumont, Texas
Galveston, Texas

Always a standard specification Tie

The bigger job!

MAINTENANCE rather than development and manufacture is the proper work for the railway car shop. Some mechanics think it's economy to attempt the building of door and step mechanism in their own shops. They lose sight of the fact that keeping the cars available for good and continuous service is the bigger job.

Manufacturing door and step-operating equipment is *our business.* Twenty years' experience has resulted in the development of the most efficient type of door engines and mechanisms, and the most economical methods of manufacturing them. This is our bigger job.

The illustration below shows our present large shop, devoted exclusively to this business.

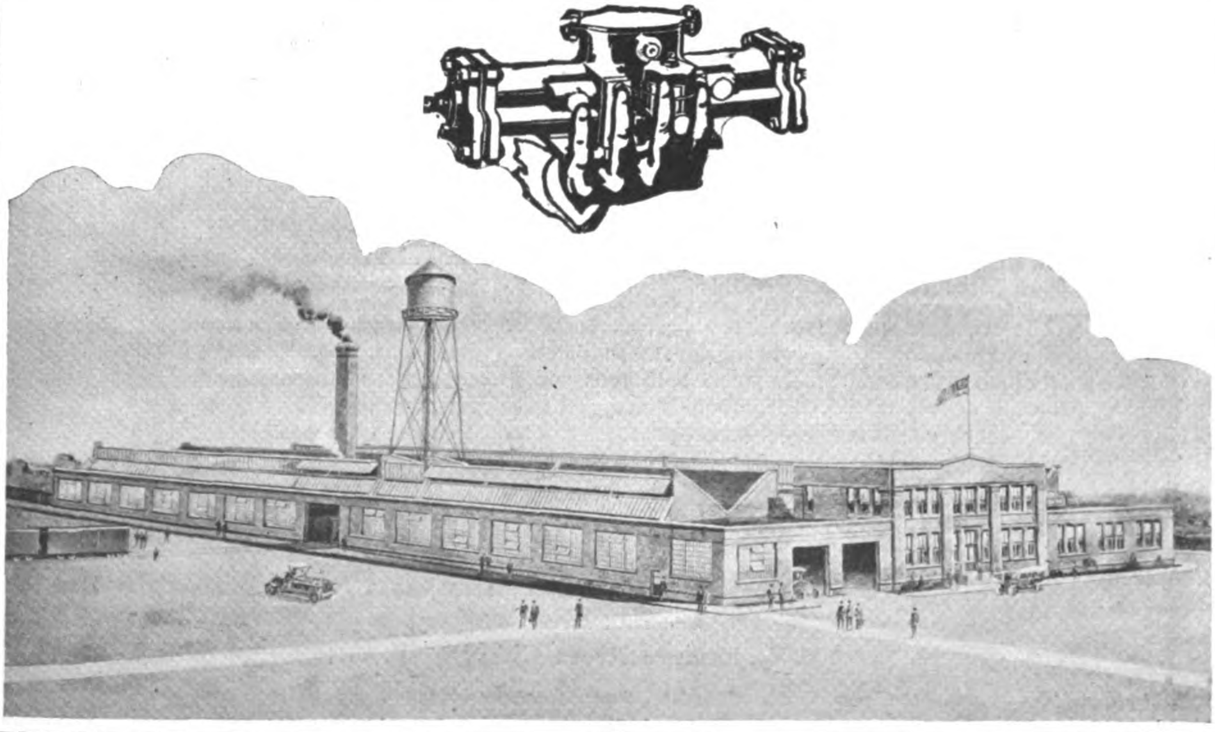
National Pneumatic Co., Inc.

Originators and Manufacturers

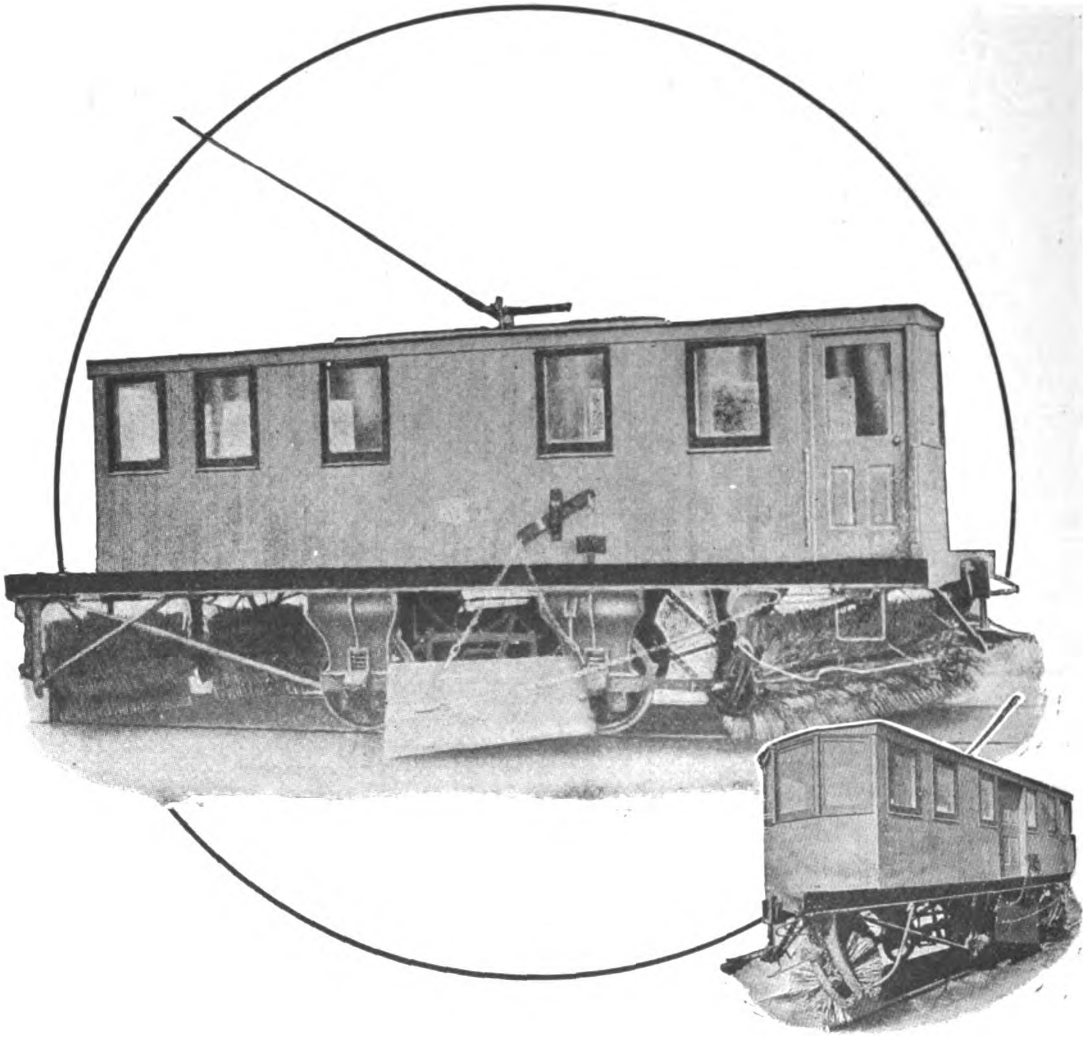
***Principal Office:* 50 Church Street, New York**

Philadelphia—Colonial Trust Building Chicago—McCormick Building
Works—Rahway, New Jersey

Manufactured in Canada by Dominion Wheel & Foundry Co., Ltd., Toronto, Ont.



SNOW!—its Removal



Efficient Snow-sweepers and McGuire-Cummings Mfg. Co. are names linked together in the mind of a majority of America's electric railway men. Fully 95% of all electric snow-sweeping equipment used in the United States and Canada is of McGuire-Cummings make.

The Standard single truck, steel underframe, long broom sweeper shown above is exceptionally strong and rigidly built, handling deep snow rapidly without stalling. The long broom clears both rails and fifteen inches additional on the outside of each track. Each broom is equipped with case-hardened roller bar steel belt chain, with detachable links.

Over 1,400 of these long-broom sweepers are in use in all parts of the world where they have snow to contend with. Sweepers are also built in other types to cover every snow-fighting problem.

McGUIRE-CUMMINGS MFG. CO.
General Offices
111 W. Monroe Street, Chicago, Ill.

City and Interurban Cars and Trucks, Safety Cars, Combination and Work Cars, Snow-Sweepers, Electric Locomotives.

Electric Railway Lubrication

Not Refinery Lubricants

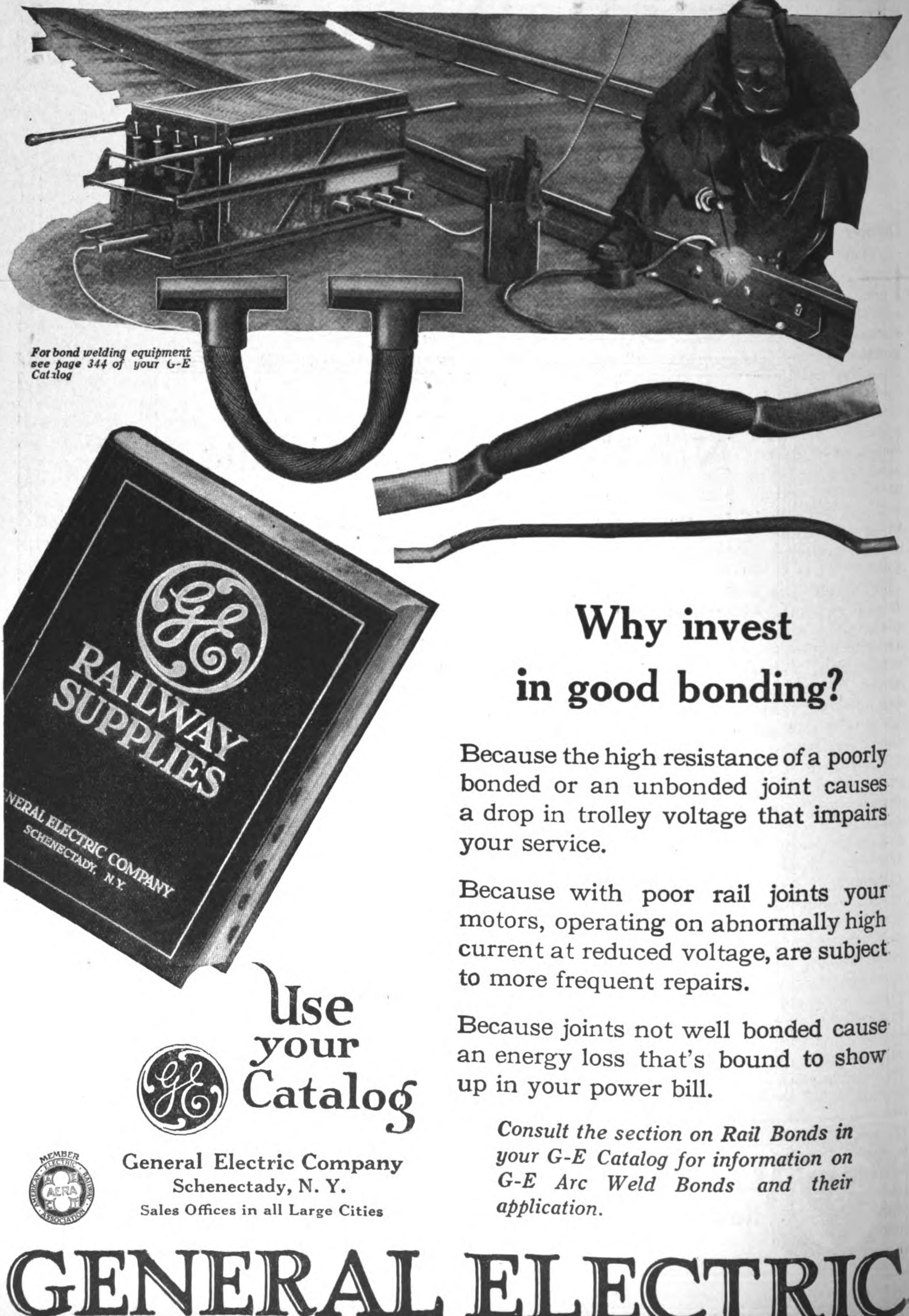
Every oil or grease bearing the Galena brand is manufactured from stocks made of the highest grade crude petroleum, built to our own specifications. Galena process completes each product—fits it for the particular function it is to perform. It must meet our special laboratory tests in every detail before it goes to the customer.

The exceptional vitality of Galena Oils—their superior strength and staying power—distinguishes them from all other railway lubricants in service results. It is a characteristic peculiar to faultless quality, both in basic materials and process of manufacture.

Galena Oils cost but little more than the ordinary refinery lubricants now marketed for electric railway service. This small price difference is insignificant when compared with the savings they make possible through increased mileage, less repairs and replacements of bearing or motion parts, and reduced depreciation—wear and tear on equipment. Galena Service, an unfailing agency for producing efficient and economical results, accompanies all Galena lubricants without cost.

"More miles to the pint;
Better service to the mile."

Galena-Signal Oil Company
New York Franklin, Pa. Chicago
and offices in principal cities



For bond welding equipment see page 344 of your G-E Catalog

Why invest in good bonding?

Because the high resistance of a poorly bonded or an unbonded joint causes a drop in trolley voltage that impairs your service.

Because with poor rail joints your motors, operating on abnormally high current at reduced voltage, are subject to more frequent repairs.

Because joints not well bonded cause an energy loss that's bound to show up in your power bill.

Consult the section on Rail Bonds in your G-E Catalog for information on G-E Arc Weld Bonds and their application.

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Sales Offices in all Large Cities

GENERAL ELECTRIC

40-297

New York, Saturday, November 24, 1923

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

Henry W. Blake and Harry L. Brown, *Editors*

Volume 62
Number 21

Chamber of Commerce Committees Make Constructive Reports

IT IS gratifying that a strong indorsement of the principle of co-ordination of service between bus and trolley is given in the report just issued by the special committee of the United States Chamber of Commerce appointed to study this question. Although representatives of the motor transport interests made up a considerable proportion of the committee, the report declares that the bus and the electric railway cannot permanently exist in a community and pay their way in competition with each other. It also says that there should be in each community a single reliable transportation agency, rather than individual transportation units, and that the electric railway is the best medium for the mass transportation of passengers and should be the foundation of the suggested co-ordinated transit system.

Nor is there any doubt as to where the committee stands in regard to regulation. Briefly, the committee says that any one engaged in the business of common carrier by motor vehicle should be subject to regulation as to its rates and service, just as any other common carrier. Regulation by state bodies having jurisdiction over intrastate traffic has been generally accepted in this country and should be applied to motor vehicle common carriers as well as to other public utilities. If a certificate of public convenience and necessity is granted to the operator of a motor vehicle, he should be compelled to furnish ample evidence of financial responsibility, or else carry insurance adequate to cover all injury to persons or damage to property resulting from negligent operation.

Of course, the need of any public carrier to assume full responsibility for damage caused by his negligence is not a new idea. The business of public carrier is one of the oldest in the world and reliability and responsibility are at the basis of the duties which the experience of centuries has shown should be placed on persons so engaged. Our present regulatory laws simply elaborate these rules to adapt them to modern conditions, particularly the replacement to a great extent of the individual carriers of the earlier days by large transportation systems. Primarily the purpose of all these laws is to protect the public by securing (1) regular and adequate service, (2) reasonable rates, and (3) responsibility of the carrier for damages which he may cause during transportation. There can be no permanent gain to any community which ignores these fundamental principles. Jitney service failed in respect to them, particularly regularity of service and responsibility, and this automatically keeps jitneys out of the class of legitimate common carriers.

The committee on taxation of motor transportation agencies of the national chamber, on which motor transport interests were also largely represented, has made an equally valuable report. It points out that present electric railway taxes are unsystematic, to say the least, yet amount, with imposts, to nearly $100,000,000 a year, while the maintenance of track amounts annually to even more than this sum. The committee comes out strongly for a tax based on both gross and net returns, rather than an ad valorem tax, for greater tax simplification and for placing the entire expense of maintaining improved highways upon the users of those highways. This latter recommendation should tend to make each form of transportation bear its fair share of the public expenditure, while the whole program of this committee if carried out should help to place the transportation agencies of this country on a logical basis and enable them to stabilize their financial status and to be of even greater help to the nation.

Proper Basis for Valuation Is of Vital Importance

VALUATION of electric railway properties continues to be a major topic for discussion. This is evidenced by the recent report of the committee on valuation of the American Electric Railway Association, printed in full in the issue of this paper for Nov. 3, and by the discussion by L. R. Nash which appears in this issue.

There have been so many differing views on the subject that the committee had much work to do to bring together the opinions and decisions rendered on the subject by the various regulatory bodies. Out of twenty-six commissions replying to a questionnaire sent out by the committee, fourteen, or more than half, belong to the class that refuses to recognize either original cost or reproduction cost of the present date as controlling, and have no definite method of relative weighting for these two evidences of value. Four others consider reproduction cost in varying degree. These eighteen, or 69 per cent of those replying, give some weight to reproduction cost, but it is difficult to determine just how far they consider it. The remaining eight commissions either ignore reproduction cost entirely or have some special theories of their own.

In view of the various decisions of the Supreme Court of the United States it is rather surprising that reproduction cost should figure so little in the decisions of the commissions. The only apparent reason why they should take this stand is that the Supreme Court itself has never made definite the weight that should be given to reproduction cost, merely stating that it must be considered. The railway valuation committee finds that the commissions in the largest group mentioned state that they consider all evidences of value which are presented and all other matters or circumstances which they feel have a bearing on the case, and then announce what they believe to be the fair value under all of the circumstances. This is subject to such a broad interpretation that it may mean much or little, though shrouding the method in mystery often leaves an opening for the feeling that politics should have been included in the list of elements considered in the final determination.

The decisions of the courts, both state and federal, show less variation, according to the committee. These have held quite generally that the basis of rate making is the present value of the property, and that the present value is not necessarily either "prudent investment," "original cost" or reproduction cost at abnormal prices. Of course this again is disappointingly indefinite, for it states what present value is not, but fails to show what it is.

Comparison of investment value and reproduction cost is brought out in a definite way in Mr. Nash's discussion. Taking a hypothetical case, he shows how the investment value may be greater or less than the cost to reproduce at prices current. Where prices are rising, the cost of reproduction is the higher; but where prices rise and then fall as they have done during and since the war, and continue to fall as he states they are likely to do in the future, the actual investment soon becomes greater than the cost to reproduce. Thus there is a real danger to the utility in attempting to secure valuation on the basis alone of cost of reproduction at current prices, in that if it were followed to its logical conclusion during an era of falling prices the rate base allowed would not be sufficient to support the securities issued.

This shows rather clearly the weakness of the position taken by former valuation committees in declaring for reproduction cost at current prices, and this, undepreciated. The 1923 committee's report is more practical, and it is believed that the position it recommends would put a company in a better light before a regulatory body. Its work is a contribution in the direction of clarification and stabilization of valuation procedure. This is exceedingly important, since higher interest rates are demanded and capital is harder to secure in proportion to the doubt that exists as to the outcome of the question of the rate base on which the utility is entitled to earn.

Secretary Mellon's Recommendations and Railway Taxation in General

WITH the opening of Congress now only a few days off, special interest attaches to the marked indorsement which Secretary Mellon's tax reduction recommendations are receiving from business interests generally. These reductions are possible, of course, only if the incoming Congress does not pass a soldier's bonus or other bill which would add seriously to the outgo of the treasury. Hence a tax reduction act at this coming session is by no means sure. Nevertheless, as the Secretary's outline will probably form the basis for any tax reduction bill introduced by the majority party, its effect on electric railway companies may be considered.

As the Secretary's recommendations contain no suggestion of a reduction in the present corporation tax of 12½ per cent on net income, the effect on railways will come primarily from the larger market which they, like other corporations, will have for their securities, due to the reduction of surtaxes. This was one of the purposes of the recommendations—the hope that some of the capital now going into tax exempt securities because of the high surtaxes would return to the field of productive business. Tables accompanying Mr. Mellon's letter to the House ways and means committee show in a striking way the virtual disappearance from the tax rolls of persons with large incomes. In the $300,000 a year class, the reduction was from 1,296 in 1916 to 246 in 1921. Under the present surtax rates taxpayers with this income practically cannot afford to invest in securities other than those which are tax exempt.

Just how far the Secretary intended his incidental suggestion about abolishing for the purpose of the income tax capital losses and capital gains is hard to say. If these were given up, it is probable that investors would seek bonds carrying a low interest rate but sold at a large discount. Thus they would have to account only for the return received as interest. Even under the present law this is rather a profitable plan for the bond buyer, because it postpones till a later year, when the income tax rate will probably be lower, the portion of the return represented by the discount at which the bond was purchased; or he can group his capital gains in one year so as to take advantage of the 12½ per cent provision.

It is to be hoped that the discussion on taxation which is bound to take place in Congress this coming session will stimulate a study of the same subject in state capitols and by municipal governments. According to figures recently issued by the National Industrial Conference Board, while federal expenditures decreased from $6,112,243,000 in 1920 to $4,849,708,000 in 1921, expenditures of state and local governments increased during the same years from $3,808,523,000 to $4,523,887,000. The opportunity to sell bonds at low rates of interest has been a contributing reason for the plethora of expenditure in which local governments have lately indulged. Here is where a conference on taxation, if undertaken by a national body of influence, like the United States Chamber of Commerce, would help. Senator McCormick of Illinois recently made the suggestion that President Coolidge call a national conference of state and local taxing authorities to consider checking the steady increase of tax burdens.

From any reform which would put on a more scientific basis our present tax laws, the electric railway industry would be almost certain to receive benefit. This is shown by the situation in New York State. Here in 1922 a committee, of which Senator Davenport was chairman, canvassed the whole tax situation, and found that the taxes of the electric railway companies in New York were proportionately to both their gross and net incomes far greater than those of any other class of utility, and still greater on net than general business corporations, the net of these corporations being the only figures available as these are the ones on which their state tax is based. The figures from New York State are probably not greatly different from those which would be found in other states. While no general relief has come as yet in New York as the result of this committee's work, it is likely that when readjustment does come something will be done in removing the obvious inequality of tax assessment from which the railways are suffering. Similarly, studies in other states would pave the way for a fairer taxing of the electric railways.

Keeping Cars on Time

The Duties of Supervisors and the Importance of Adherence to Time-Tables Discussed by J. R. Ong in His Los Angeles Report—Other Suggestions for Improvement of Service

AN ACCOUNT of the traffic situation in Los Angeles, based on a report recently made to the management of the Los Angeles Railway Corporation by Joe R. Ong of Piqua, Ohio, was published in the issue of this paper for Nov. 3. That article also gave a number of ways by which, through the co-operation of the city, the situation could be helped. Mr. Ong's report included also observations as to electric railway operation in Los Angeles, with a discussion of supervisors and time-tables. An abstract follows of those observations of most general interest, with some additional information on the form of supervisor's book mentioned.

Adequate supervision is an essential feature of satisfactory service. Supervisors are the company's official representatives in directing the operation of cars on the streets. They should be able to grasp a situation and act quickly, at the same time displaying good judgment in their decisions.

Quite naturally, supervisors are recruited from the list of motormen and conductors because such a background of experience is necessary. In order that a supervisor's position may appeal to the trainmen best suited for it, it should be attractive not only because of its increased responsibility and authority, but also because of its financial advancement. In Los Angeles supervisors' salaries should be materially increased above the present scale so that it will be possible to attract the best men in the train service. The hours should be arranged to alternate the day and night work for all supervisors, the changes being made at intervals of two weeks or four weeks, because straight night work as a supervisor for several years makes little appeal to a platform man holding a good day run.

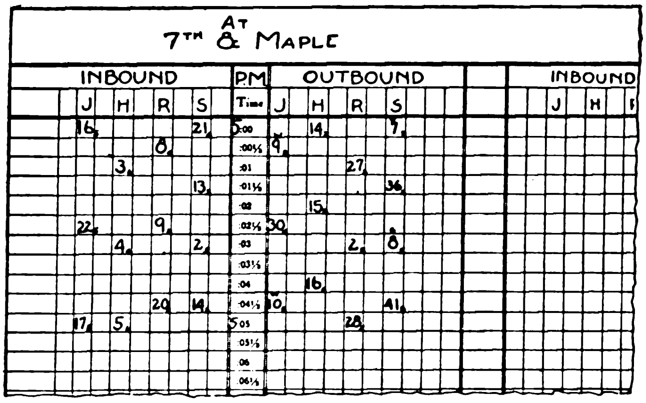
Duties of Supervisors

A supervisor's chief duties are to keep cars on time under normal conditions of operation and to see that patrons of the line get the best possible service under any unusual conditions that may arise. Normally, therefore, the supervisor should be watching his cars and checking their actual time against their scheduled time and ascertaining the cause for any deviations. Chronic cases of irregular operation should be checked in particular and fully reported so that appropriate measures for correction may be taken.

Obviously a supervisor cannot check his cars from memory unless he has very few cars on a regular but infrequent headway. It, therefore, has been the practice to supply the supervisors with schedule data showing the time cars are due to leave the terminals, arranged in the order in which they are due to leave. Many supervisors carried only the terminal times in their books and had no time shown at the point where they were stationed for a period of several hours daily. The result was that an individual mental calculation of time had to be made in order to check each inbound car by adding to the terminal time the running time to the point of observation, and to ascertain if that total corresponded to the observed time.

Upon Mr. Ong's recommendation there was adopted an improved type of supervisor's book which greatly facilitates his work. Time by half-minute intervals is printed in a column in the center of the page. The left half of the page is used for inbound cars and the right half of the page is used for outbound cars, one column being reserved for each route passing the checking point for which the book is made up.

The new book is made up to show the time that each car on the schedule is due to pass the supervisor's station by having its train number in the proper route column on the proper horizontal time line. This enables the supervisor to tell quickly whether the car is on time, late or ahead of time. The clearly detailed yet compact arrangement of the schedule data enables him to tell quickly the relative position of the cars from different routes on common track, and if at a junction he can readily direct which car should have the preference when two arrive at the same time.



AT
7TH & MAPLE

INBOUND				PM	OUTBOUND			
J	H	R	S	Time	J	H	R	S
16			21	5:00		14		7
		8		:00½	9			
	3			:01			27	
			13	:01½				36
				:02		15		
22		9		:02½	30			
	4		2	:03			2	8
				:03½				
				:04		16		
		20	14	:04½	10			41
17	5			5:05			28	
				:05½				
				:06				
				:06½				

INBOUND
J H

Page from Supervisor's Time-Point Book, as Used in Los Angeles

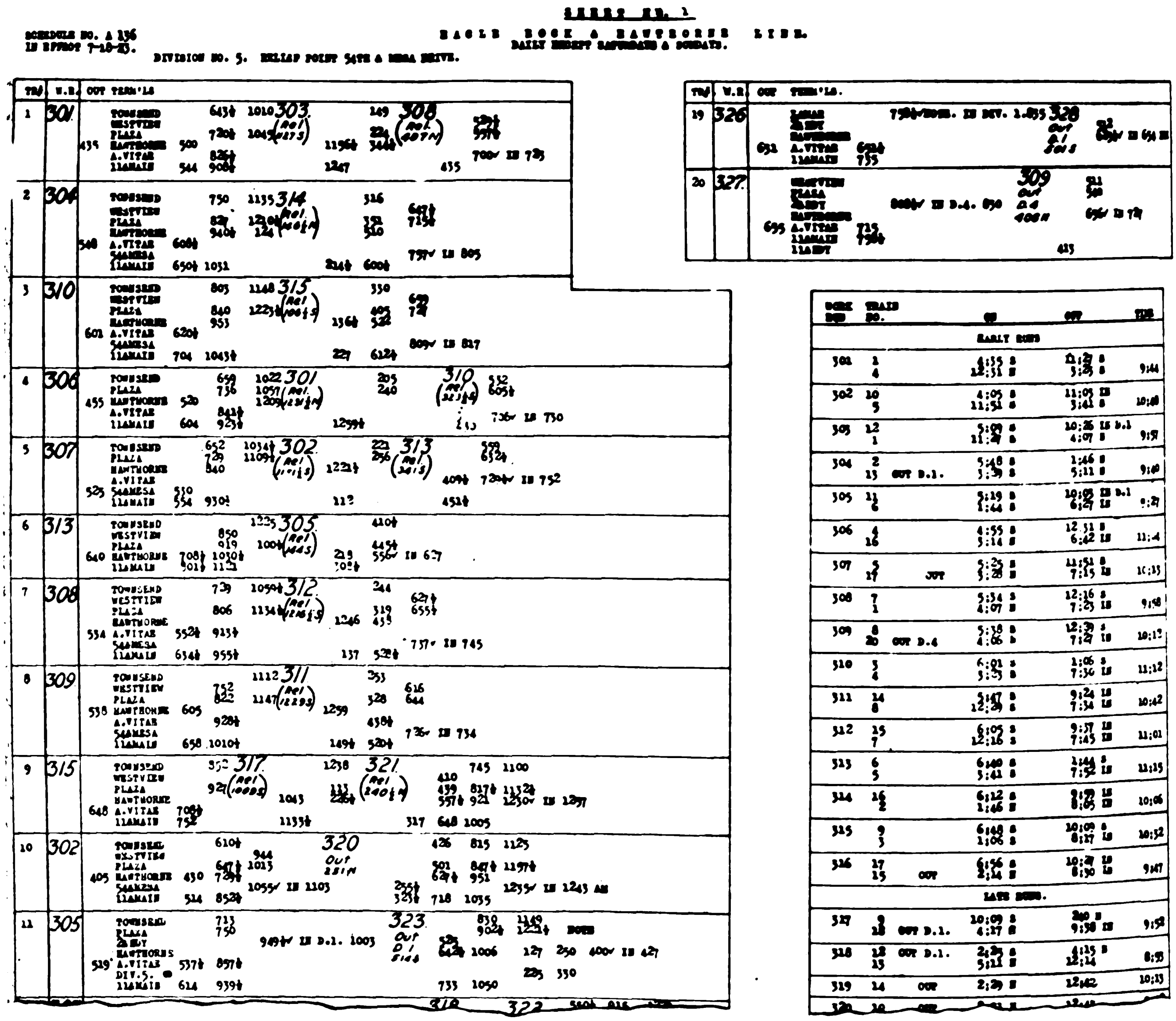
A part of a page of this book is reproduced. The letters J, H, R and S indicate routes. J and S are split lines, i.e., the cars run to two terminals. The large figures show train numbers. The small figures show minutes layover at the next terminal.

The figures are inserted in this book before the supervisor goes out on the street and he makes no notes in the book on the street. It is his reference book on schedules in concise form so that he can quickly determine when the cars should pass him.

All figures in the book except the headings are put in with pencil so that in the event of a schedule change on one line the train numbers on the old schedule are erased and the new train numbers put in without the necessity of making a whole new book. The supervisor may indicate by key letters or characters the destination of cars on split lines or cars scheduled to short terminals, and other information such as night cars which he may desire to watch with particular care after the headways begin to spread.

To protect the book from the weather, sheets of transparent celluloid may be cut to page size and held on by rubber bands. For very wet weather a celluloid case large enough to take the book when open may be used. Such a case is very similar to the identification card case one carries in the pocket except for size, closed on three sides and open at the bottom.

As explained, the book shows by a small number the layover at the next terminal for each train, so that the supervisor has right before him the number of minutes



EAGLE ROCK & HAWTHORNE LINE

Running times between time points for Schedule No. A-136, in effect July 18, 1923

LV. TOWNSEND

From 7:35 P.M. to 5:54 A.M. use No. 1
5:55 A.M. to 6:27 A.M. use No. 2
6:28 A.M. to 8:19 A.M. use No. 3
8:20 A.M. to 11:21 A.M. use No. 4
11:22 A.M. to 1:41 P.M. use No. 5
1:42 P.M. to 4:14 P.M. use No. 6
4:15 P.M. to 5:09 P.M. use No. 7
5:10 P.M. to 5:34 P.M. use No. 8
5:35 P.M. to 7:34 P.M. use No. 9

LV. HAWTHORNE

From 7:15 P.M. to 5:33 A.M. use No. 10
5:34 A.M. to 6:04 A.M. use No. 11
6:05 A.M. to 8:14 A.M. use No. 12
8:15 A.M. to 10:59 A.M. use No. 13
11:00 A.M. to 3:49 P.M. use No. 14
3:50 P.M. to 4:49 P.M. use No. 15
4:50 P.M. to 5:24 P.M. use No. 16
5:25 P.M. to 7:14 P.M. use No. 17

TOWNSEND TO	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9
Westview	5½	7	7	6	6	6	6	5½	5½
So. Vdgo	7½	9	9	8½	8½	8½	8½	7½	7½
28 & Day	8	8½	8½	8	8	8	8	8	8
Bdge. Jct	5½	5½	5½	5½	5½	5½	5½	5½	5½
Plaza	6	7	7	7	7	7	7	7	7
1st. & Spg	3	3	3	3	3	3	3	3	3
7th & Bdy	6½	6½	8	8	9½	9½	11½	8	8
11 & Main	3½	3½	3½	3½	3½	3½	4	3½	3½
Wash	3½	3½	3½	3½	3½	3½	4½	3½	3½
Jeff	4	4½	4½	4½	4½	4½	5	4½	4½
Hoover	5	5½	5½	5½	5½	5½	6½	6½	5½
Dalton	3½	4	4	4	4	4½	5	5	4
54th	9	10	10	10	10	11	11½	11½	10
67th	3½	4	4	4	4	4	4½	4½	4
Regent	5½	6	6	6	6	6½	6½	6½	6
A. Vitae	3	4	4	4	4	4	4	4	4
Hawthorne	7½	8	8	8	8	9	9	9	8

HAWTH. TO	No. 10	No. 11	No. 12	No. 13	No. 14	No. 15	No. 16	No. 17
A. Vitae	7½	8½	9½	8½	8½	8½	8½	8½
Regent	3½	4	4	4	4	4	4	4
67th	5½	6	6½	6	6	6	6	6
54th	3½	4	4	4	4	4	4	4
Dalton	7½	10	10	9	9	9	9	9
Hoover	4	4½	4½	4½	4½	4½	4½	4½
Jeff	5	6	6	6	6	6	6	6
Wash	4	4	4½	4½	4½	4½	4½	4½
11th	3½	3½	4	4	4	4	4	4
7th & Bdy	3½	3½	3½	3½	3½	4½	3½	3½
1st. & Spg	6½	6½	8	8	9½	11	8	8
Plaza	3	3	3	3	3	3	3	3
Bdge. Jct	6	6	7	7	7	7	7	7
Ave. 28	5½	5½	5½	5½	5½	5½	5½	5½
So. Vdgo	8	8	8	9	9	9	9	8
Westview	9	9	9	10	10	10	10	9
Townsend	6½	6½	6½	8	8	8	8	6½

The Upper Table Is a Reproduction of Part of a Schedule Sheet, with Run Guide and Working Times for Crews. The Lower Table Shows in Type the Running Time Between Time Points in the Schedule Sheet Reproduced Above leeway he has on the outbound car before it will be necessary to consider turning it short of destination. For example, if an outbound car has seven and one-half minutes layover and passes the supervisor six minutes late it should leave the terminal on time. If the car was twenty minutes late outbound with only seven and one-half minutes layover it lacked twelve and one-half minutes of having time to make the terminal to leave on time. The supervisor then may put this car on time by turning it back at a crossover from which the running time to the terminal and return is not less than twelve and one-half or thirteen minutes.

The advisability of turning cars short of scheduled destination is a matter that must be considered in the light of circumstances and conditions at the time. It would depend upon how many passengers the car had on board, upon whether the prevailing direction of travel was outbound or inbound, upon whether other cars were immediately ahead of or behind the car to be turned short, and perhaps on some other conditions.

The elimination of, or a reduction in the number of, turnbacks may be a general indication of improved operating conditions, but the fact must not be overlooked that there are times and conditions when the service would be benefited if there were more turnbacks. There are usually more people desiring transportation at other points along the line than at the terminals and they are to be considered. Day cars which are late in the morning rush and night cars which are late in the afternoon rush often can be advantageously put on time by turnbacks, and the service to the terminal supplied by a tripper which is due to pull in.

STREET SUPERVISION EIGHTEEN HOURS A DAY

On a system the size of the Los Angeles Railway there should be direct supervision on the street for approximately eighteen hours per day, according to the following plan. Supervisors should be located at strategic points for control of the various lines. On through routes there should be a supervisor located on each half of a line at a point beyond the congested area, each supervisor looking after one or more lines passing his station.

One supervisor should be held primarily responsible for each line to avoid confusion over orders, but the supervisor stationed on the other half of the line should assist in carrying out the plan of control determined upon by the supervisor in charge. In fact, each supervisor should have in his book the times of cars on all lines past his station—not that he will have to work all of them but that he should be in a position to step in and take action in an emergency.

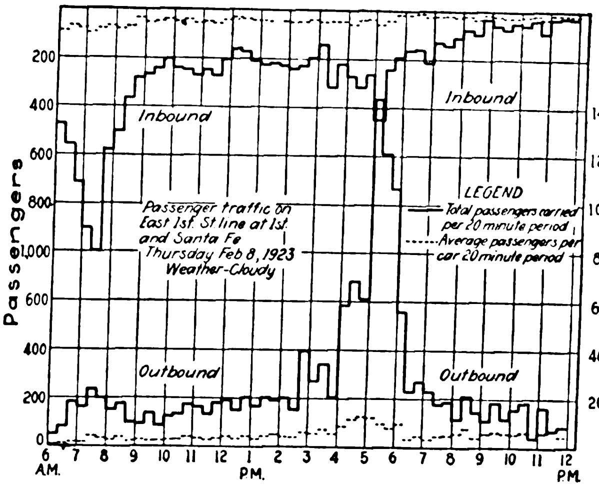
It is not contemplated that a point supervisor can never be taken off the point. He should leave his station to go to an accident, derailment or blockade if he can do more good there, but except in emergencies he should stay at his point, which, if properly selected, is the strategic point for the control of the lines under his direction.

The objection is sometimes raised to point supervision on the ground that the crews always know where the supervisors are located and may be leaving terminals late, running by passengers or running ahead of time because they think it will not be discovered. If the point supervisors are giving careful attention to the cars passing their stations they will usually be able to detect any serious irregularities. A limited number of traveling supervisors should be assigned to travel on several lines to correct such matters as mentioned in this paragraph and to follow up cases of recurring irregular operation reported by the point supervisor.

On many street railways the division superintendents have the responsibility for the operation of cars on the street, but on the Los Angeles Railway this function is delegated to "district chiefs" under the director of traffic. The district chiefs should be assigned to a certain territory and have general direction of all lines and all supervisors within that territory. Territorial division for the district chiefs is to be preferred over a group of through lines, because it enables them to cover the lines with less lost motion or duplication of supervision on trunk lines. It gives a better distribution of their services.

PREPARATION OF SCHEDULES

In the preparation of schedules Mr. Ong's recommendations for using traffic graphs have been adopted and are now in effect. Twenty-minute charts (similar to that shown below) for several different days are taken and analyzed, with one day compared with another and corrected for distortions. A representative one is then selected. From it the headways are determined based on the number of passengers carried. For example, the chart published shows approximately 250 passengers as the average sustained maximum per twenty-minute period during the middle of the day in the controlling direction of travel, which is inbound. If it is desired to schedule service on the basis of fifty passengers per car, then five cars will be required in each twenty-minute period, resulting in a four-minute headway. It may be noted that after 11:40 a.m. the inbound travel falls off so that a four-minute headway throughout the middle of the day would show an average of less than fifty passengers per car.



Schedules Are Drafted After Studies of Charts Like This

In a similar manner the headways required for other periods are calculated except that in the rush hours the average number of passengers per car must be increased to perhaps eighty or eighty-eight. To carry 1,300 passengers per 20-minute period on the basis of eighty per car would require a one and one-quarter-minute headway. And in this manner the required headways past the point of maximum load are selected. In translating the twenty-minute chart into headways a convenient table has been devised which shows the passenger carrying capacity on different headways at different densities of loading per car.

In addition to the traffic charts from which the headways are determined, the schedule maker must also have riding checks to show the time required between time points all along the line at the different periods of the day. Preferably he should make several trips himself over the line to refresh his knowledge of conditions.

Where all cars do not go through to the end of the line, short line cars should follow longer headways than through cars in order to balance the loads on the long and short line cars. Thus, an average main-line headway of five minutes might be split as a six-minute interval before the short-line car and a four-minute interval before the long-line car, or the differential cut to one minute by using five and one-half and four and one-half-minute spacing.

A change has been made in the form of the schedule and crew assignment sheets. Formerly the schedule sheet showed the leaving times of each train number from one terminal on the left half of the sheet and from the other terminal on the right half of the sheet, all on one horizontal line. To follow a train number through its operation from the time it left the carhouse until it pulled into the carhouse it was necessary to look back and forth from one side of the sheet to the other. This schedule sheet was never posted for the trainmen but was used for office reference. Copies were secured by the ditto-graph.

For the trainmen's use there was a large sheet that showed the day's work for a crew arranged in a horizontal section of the sheet, giving the various times at which they were due to leave the terminals and the times when reliefs were made. On this sheet the various pieces of work by each crew were grouped together, but in order to follow one car or train on its schedule throughout the day it was necessary to look all over the sheet for the particular train number. For the division clerks, the timekeepers and the auditor's office a condensed work run sheet was supplied showing "time on" and "time off" for each piece of work for each crew and the total time of the run. Thus, on the old plan, the information was grouped three ways on three forms.

NEW SCHEDULE REPLACES THREE SHEETS

On the new form of sheet (see page 888) the information that was formerly in three places has been combined on one form and additional information shown. The run guide as arranged in the form previously sent to the timekeeper is retained in the new schedule sheet. The times that cars are due to leave terminals and one intermediate point on each half trip are shown in the body of the schedule. The intermediate time shown is usually for the time point just at the edge of the congested area inbound.

The details of runs are read horizontally, and each section of the details of runs represents the movements of an individual car or train during the day. The movements of each individual crew are indicated by run numbers written in bold figures, so that the various pieces of work of each individual crew may readily be picked from the schedule. By using this method, the schedule permits one to follow all movements of cars as well as crews, a feature which is not easily possible when each horizontal section of the details of runs refers to the day's movements of an individual crew rather than of an individual car.

The new schedule sheets are prepared on the typewriter and are arranged for blueprinting so that as many copies as desired may be had at any time. All working copies should be blueprints. The master copy should be kept corrected to date so that any copies taken at any time may be correct. An office copy, a carbon copy of the original, should be kept to show the successive changes and alterations without obliterating the original figures, so that ready reference may be had at any time to the exact times on the schedule on any particular date.

WORK ASSIGNMENTS FOR TRAINMEN

It is also a part of the work of the schedule department to make up the work runs for motormen and conductors after the schedules have been prepared. Inasmuch as schedules are based on the demands of traffic they should be laid out to meet that demand as nearly as is reasonably possible and not with the idea of providing work runs for any individual trainman or group of trainmen. Conditions controlling the number of cars operated are something which the company cannot change and therefore it is not to be expected that work runs for the motormen and conductors can be laid out exactly the same from one schedule to another. The cars cannot leave and return to the carhouse at the same times on all schedules.

Those not familiar with the street railway business sometimes find it difficult to understand why the working conditions for motormen and conductors cannot be made the same as working conditions for employees in other lines of business. For example, the question is raised why is it necessary for street railway men to have such a long spread of time in which to complete a day's work. It might help some in the understanding of this question if reference were made to the lower chart on page 772 of the Nov. 3 issue showing the cars scheduled for operation on April 2, 1923, by one-hour periods throughout the day. Cars must be on the street in time to take other employees to their places of business in the morning, and cars must be on the street to take other employees home and return to the carhouses in the evening, so that street car men are required to extend their day's labor over a long period of time.

Many references have been made to the morning and afternoon rush periods when great masses of people demand transportation within limited periods of time. This uneven demand for service is one of the fundamental characteristics of the business which every street railway would gladly change if it could, because it affects not only the working conditions for the trainmen, but also involves a heavy expense on the part of the company for cars, carhouses, power, substations and equipment in use for only a limited period.

One of the fundamental difficulties in connection with the operation of cars on the Los Angeles Railway was that too many of the cars were operated as trippers by extra crews and not enough of the cars were made a part of regular runs. This means an unusually large extra list and it means that men have to "fight the extra board" for perhaps several years. This is not a satisfactory condition of affairs and could be improved by allowing a slightly greater spread in the runs so that the day crews coming out of the carhouse not too early in the morning could be used again in the afternoon rush.

It is apparent from the chart on page 772 of the Nov. 3 issue that a great many crews must be used both morning and afternoon if the total number of cars operated are to be handled efficiently. The spread in the runs on the lines of the Los Angeles Railway is not excessive and in fact is much lower than the spread in runs on most other large city properties. It is considered a distinct detriment to the service, without being an advantage to any particular number of men, to maintain the old system of making up runs. It was recommended that more of the trippers be worked into parts of regular runs and that the allowable spread in the time to complete the day's work be sufficiently extended to permit this.

OTHER SERVICE IMPROVEMENTS

A number of other service improvements were also introduced as a result of the survey. Thus, the layover time was reduced by introducing more time points, particularly during the outbound trip and by an adjustment of running time to meet the varying conditions of operation. This kept some motormen from speeding and resulted in better spacing of cars along the line and less bunching of cars at the terminals. Further reduction in layover time is expected to follow the adoption of a further differential in running times. It had been the practice for some time on the Los Angeles Railway lines to have only two running times, i.e., "short" time and "long" time. Short time was from 6:15 p.m. to 7 a.m. and long time from 7 a.m. to 6:15 p.m. It will be noted that the new schedule on page 888 calls for several running time changes in twenty-four hours.

Larger train number plates were put on so that the supervisor could distinguish train numbers more quickly and easily. Formerly the train number was on a 2½-in. disk and was carried inside the window on the front end of the car only. The new train number plates are of sheet metal 5½ in. x 6 in., with aluminum leaf letters on a black background. Two are used for each train, one placed on the front end and the other on the rear above the window to the right of the center line of the car. The train numbers stay in place from the time the car leaves the carhouse until it returns to the carhouse, while it is on the same train run.

A clear and more definite system of route and destination sign is under consideration. The report favors roller signs adjustable from within the car, rather than metal roof and dash signs, because the former can be changed only if some one climbs to the roof, and both require more trouble to change the car from one route to another.

CARS AND SPECIAL WORK

A low-floor car designed to facilitate the rapid handling of passengers was recommended. One-man cars have been found too slow for operation in the congested area and to cause additional delays. The report recommended two-car units for mass transportation, particularly for operation on heavy lines. For the lighter lines which run through the congested area a one-man-two-man car was recommended to supersede the safety car for conditions existing. These cars would operate with one man except during rush hours.

The report also urges the addition of more special trackwork, so that the opportunities for turnbacks and for maintenance of service by diversions during emergencies may be increased. On some lines the skip stop or alternate stop plan is now in force, and it is recommended that the same plan be extended to all lines.

Statistics on Twelve Large Properties

STATISTICS showing a comparison between six of the largest surface lines and an equal number of rapid transit properties are presented herewith. They afford an interesting comparison of these figures with the figures which show the results of the electric railway industry as a whole, as published in ELECTRIC RAILWAY JOURNAL, on page 578, of the March 31, 1923, issue.

While the 121 companies covered in the analysis on March 31 produced gross earnings of over $393,000,000, the twelve city properties under consideration showed a total of over $316,000,000, although they operate only one-ninth of the track mileage in the United States. Of these twelve properties, six are classed as rapid transit, although only three operate elevated or subway lines exclusively, the other three being in combination with surface lines. Each of the twelve companies collected over $8,000,000 in its last fiscal year and its average receipts exceeded $26,000,000. The prevailing rate of fare varies, three charging 5 cents, two 5 cents with a 2-cent transfer charge, one 5 cents with a 1-cent transfer charge, four 7 cents and two 10 cents, while in some cases the company sells tokens at a lower rate.

Gross earnings of the six surface properties show a decrease of 3.5 per cent below the previous year, while operating expenses, including taxes, decreased only 1.6 per cent. For the rapid transit companies the increase in receipts was 1.7 per cent and the decrease in cost 6 per cent. The operating ratio for the surface group averaged 83.34 per cent, as against 85.08 per cent in the previous year, and ranged from 68.93 to 93.35 per cent. The average for the rapid transit group was 71.63 per cent, ranging from 59.08 to 83.03 per cent, compared with an average of 77.92 per cent in the preceding twelve months. Considering only the three roads which operate subways or elevated lines exclusively, the operating ratios average 69.17 per cent, as against 75.9 per cent in the previous year.

The total passengers per mile of single track operated showed an increase of 0.89 per cent for surface companies and 4.7 per cent for rapid transit lines. The number of passengers per mile of track in the former group ranged from 929,650 to 1,940,456, and in the latter group from 1,263,286 to 1,463,592. Several companies, however, do not keep account of transfers and free passengers and for that reason the figures shown are low. On the surface lines, less service was rendered by each car in the past year than in the preceding year, the annual miles operated per car averaging 34,877, as against 35,862. On rapid transit lines

STATISTICS PER CAR-MILE AND PER CAR-HOUR ON TWELVE LARGE ROADS

	Six Surface Roads				Six Rapid Transit Roads			
	1919	1920	1921	1922	1919	1920	1921	1922
Transportation revenue per car-mile	38.9 cents	44.7 cents	47.8 cents	47.8 cents	33.1 cents	38.0 cents	40.7 cents	40.8 cents
Expenses and taxes per car-mile	32.5 cents	37.6 cents	43.2 cents	43.2 cents	25.9 cents	30.6 cents	33.4 cents	31.1 cents
Transportation revenue per car-hour	$3.26	$4.00	$4.03	$3.14	$4.21	$4.63	$5.21	$5.14
Expenses and taxes per car-hour	$2.75	$3.37	$3.62	$3.64	$3.25	$3.70	$4.13	$3.81
Operating ratio, per cent	83.06	87.45	85.08	83.34	74.00	77.26	77.92	71.63

there was an increase, the figures being 39,271 for the last year against 38,557 in the preceding year.

Revenue passengers on surface lines increased 1.1 per cent and the car mileage was less by 0.55 per cent. On rapid transit lines the number of passengers increased 3.3 per cent and there was an increase of 1.7 per cent in service. The average car-miles per car-hour on surface lines increased 1.1 per cent over the previous year, while the rapid transit lines remained the same. The figures just given used to be considered as an index of speed performance, but in recent years car-hours have been so augmented by contract requirements that it is no longer regarded as of much value. The figures given above as well as those contained in the table are for the twelve largest companies, five of which have a fiscal year ending June 30, while the others have a fiscal year more nearly corresponding to the calendar year.

Rapid Transit Parkway Proposed for New York

For Outlying Sections, with Track on Surface, Commission Engineer Declares Cost About Same as Elevated and One-Third that of Subway

AN ACCOUNT was published on page 572 of the issue of this paper for Oct. 6 of a rapid transit parkway line, recommended as part of the New York Transit System by Daniel L. Turner. The report of Mr. Turner goes into considerable length as to the advantages of this system over an elevated or subway line for undeveloped portions of a city. Briefly, the plan consists of a reservation strip approximately 500 ft. wide with two or four tracks in the center and vehicular, overhead or under crossings about every third or half mile. The right of way would be divided as shown in the accompanying section.

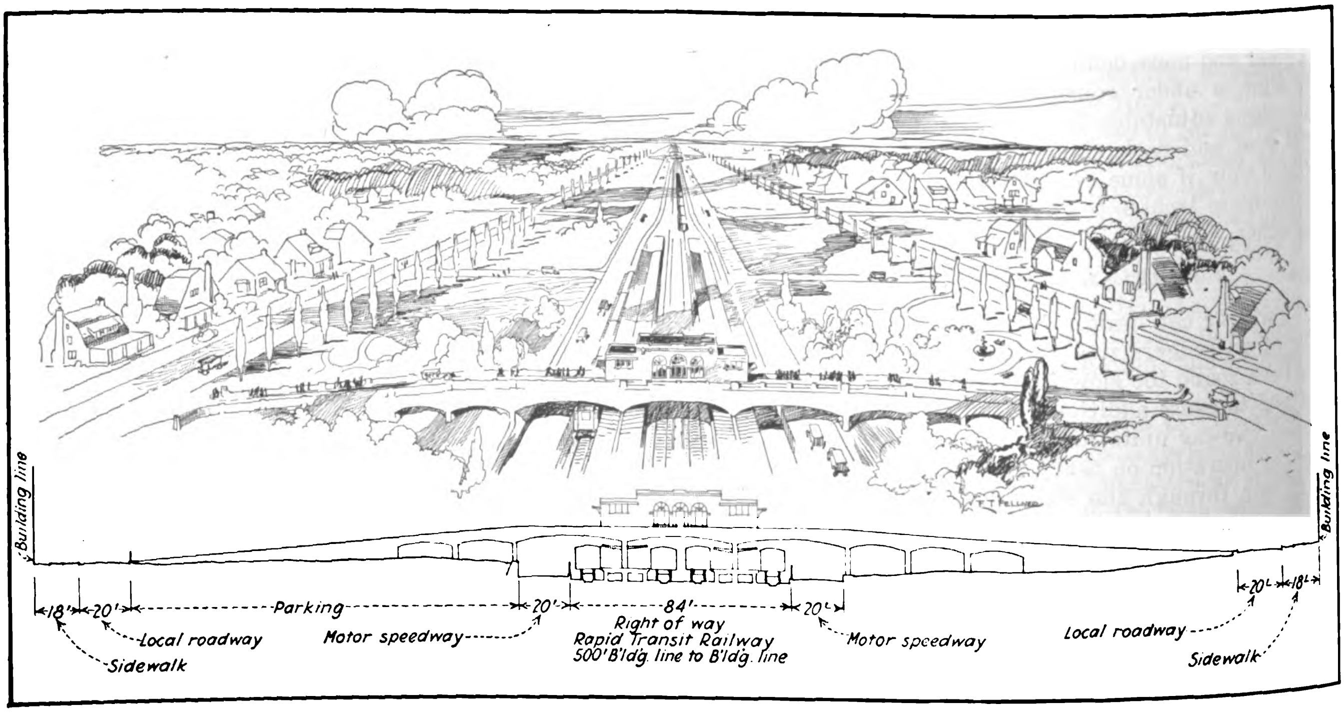
Mr. Turner points out that such a line would have all the advantages of an elevated line, in that it is in the open air, and also the advantages of a subway in that it does not disfigure the streets or cut off light and air from abutting property.

As regards cost, Mr. Turner estimates that such a line, including real estate in suburban territory, would be slightly more expensive to build than an elevated line, but considerably less costly than a subway, based on the figures of $2,300,000 per route-mile for a two-track subway line and $700,000 per route-mile for a two-track elevated line. For everything except real estate for a two-track parkway line, built either in open cut or on embankment or as an elevated railroad, as best suited to the topographical conditions, Mr. Turner allows $500,000 per route-mile and believes that the real estate for a 400-ft. wide strip could be secured for $400,000 a mile and if 100-ft. wide for $100,000 a mile. The approximate unit cost figures, including real estate for a two-track structure, would be as follows:

	Per Route-Mile
For a two-track subway line	$2,300,000
For a two-track elevated line	700,000
For a parkway line through a 400-ft. wide strip costing $400,000	900,000
For a parkway line through a 100-ft. wide strip costing $100,000	600,000

In his remarks on cost Mr. Turner says: "The conclusion seems inevitable that through undeveloped country, instead of building elevated lines as we have done in the past, the parkway line should be built, a wide parkway line if possible, but in any event a narrow parkway line, and that the land necessary for such parkway should be obtained in advance and held until the building of the rapid transit line becomes necessary."

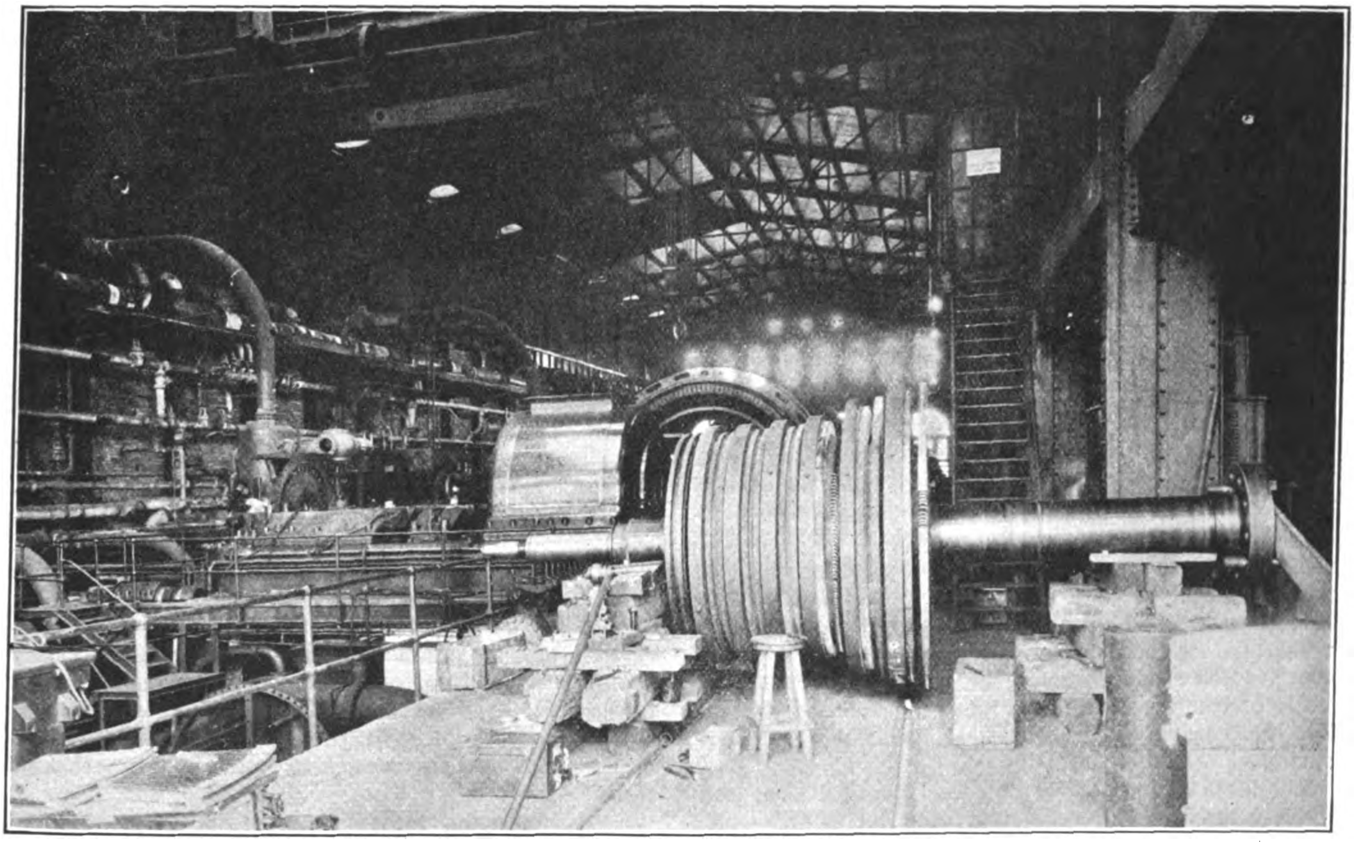
In discussing the matter of assessment of cost, Mr. Turner says that while the New York State law provides for local assessment for rapid transit lines, based on the enhancement in land values, no rapid transit line has yet been built under the assessment plan. Nevertheless, an assessment for a parkway is a common procedure and should meet with no obstacles of any kind, particularly if the parkways are to be of the width and importance that a strip approximately 400 ft. wide would permit to be developed, thereby bringing the parkway within a half mile of everybody living within the area developed in such a manner.



Section of Suggested Parkway Line for Rapid Transit Development in Outlying Sections of New York

Remodeling a Power Plant to Improve Performance

Batavia Station of C., A. & E. R.R., Twenty-two Years Old, with Changes Costing $11 per Kilowatt, Has 12 per Cent Lower Water Rate and 30 per Cent Less Maintenance—Capacity Also Is Increased About 10 per Cent



This View of the Engine Room Shows the High-Pressure 7,500-Kw. Turbine Under Repairs

EXTENSIVE changes have been going on in the Batavia power plant of the Chicago, Aurora & Elgin Railroad for the past year, the idea being to improve the efficiency of the station. While the work is not yet fully completed, the results to date indicate that evaporation will be bettered approximately 9 per cent, and the turbine and engine water rates will be decreased approximately 12 per cent. The maintenance budget for the last half of 1923 is almost 30 per cent less than maintenance expenditures for the last half of 1921, before the new work was started. On this reconstruction H. W. Brooks acted as consulting and construction engineer.

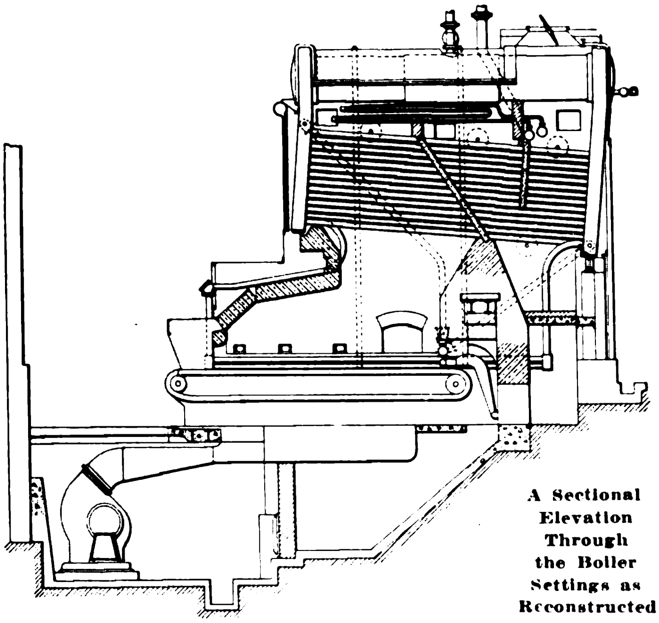
Though not an original objective of the work, the output of the rehabilitated equipment has been increased about 2,000 kw. Line drops and distributing losses have been decreased materially, while the railway schedule has been speeded up and the service made more frequent. The possibility of service interruption has been reduced to a minimum. The plant as remodeled, if kept in a reasonable state of repair, should render effective service for at least ten to fifteen years at economies comparing favorably with the average obtained in modern plants of equal size. Based on the station capacity the entire cost of the work will not exceed $11 per kilowatt. Including the new line and substation work the total unit cost will not exceed $15.

The original station, installed in 1901, consisted of three 1,500-kw. and one 1,800-kw. engine generators driven by 32x64x60-in. cross-compound Corliss condensing engines at 75 r.p.m. This equipment was augmented in 1912 by a 7,500-kw., 1,500-r.p.m. condensing turbo-generator and a 3,000-kw., 1,500-r.p.m. low-pressure condensing turbo-generator. All this generating equipment is rated liberally, however, in comparison with present standards, tests having proved the continuous 40-deg. capacity of the station to be about 18,000 kw., with 22,000 kw. obtainable on the swings. Three-phase, 25-cycle current is generated at 2,300 volts. Each generator is connected through a separate bank of transformers to the station 26,300-volt, three-phase bus, and all switching is done on the high-tension side.

In the boiler room there are eighteen 5,000-sq.ft. water-tube boilers equipped with chain-grate stokers. Steam is now generated at 200-lb. pressure and 150 to 200 deg. superheat.

Four boiler settings were excavated beneath so as to lower them, their stokers, hoppers and accessory equipment by 4 ft., thus increasing the height of the combustion chamber from 8 to 12 ft. This permitted increased combustion efficiency, particularly with the long-flaming, high-volatile southern Illinois and Indiana screenings burned. The method of excavation was found more economical than the more usual plan of raising the boilers.

The natural draft stokers on these four boilers were replaced with forced-draft chain-grate stokers equipped with side-wall tubes and pressure water bags. With the forced-draft stokers the fluctuations of the load, which are especially heavy in railway service, are accommodated readily through the greater inherent flexibility of this type, while the steady base load is carried by the natural-draft boilers at their most efficient rating.



A Sectional Elevation Through the Boiler Settings as Reconstructed

While the furnaces were being rebuilt it was considered advisable to reconstruct the old baffles, which were of the standard type, nearly vertical, replacing them with inclined baffles, thus tapering the gas passages to follow as closely as possible the reduced volume of the gases with their shrinkage at lessening temperatures. The lower entrance velocity aids the draft and relieves clogging of the gas passages by slag present in large quantities in the Illinois and Indiana screenings. Two different types of baffles were installed for competitive purposes, the interlocking tile type with plastic joints on two boilers, and monolithic baffles shot with a cement gun on the other two. The aggregate found most satisfactory for the monolithic baffles consisted of two and one-half parts of ganister screened through ⅛-in. mesh with one part of portland cement and one part of ordinary fire clay.

Experiments were made to determine the correct amount of excess air to be introduced and the correct location for orifices. Dampers or grates will be placed over these orifices later and calibrated in such a manner that the firemen always will know what setting to employ with a given fire condition and steam flow.

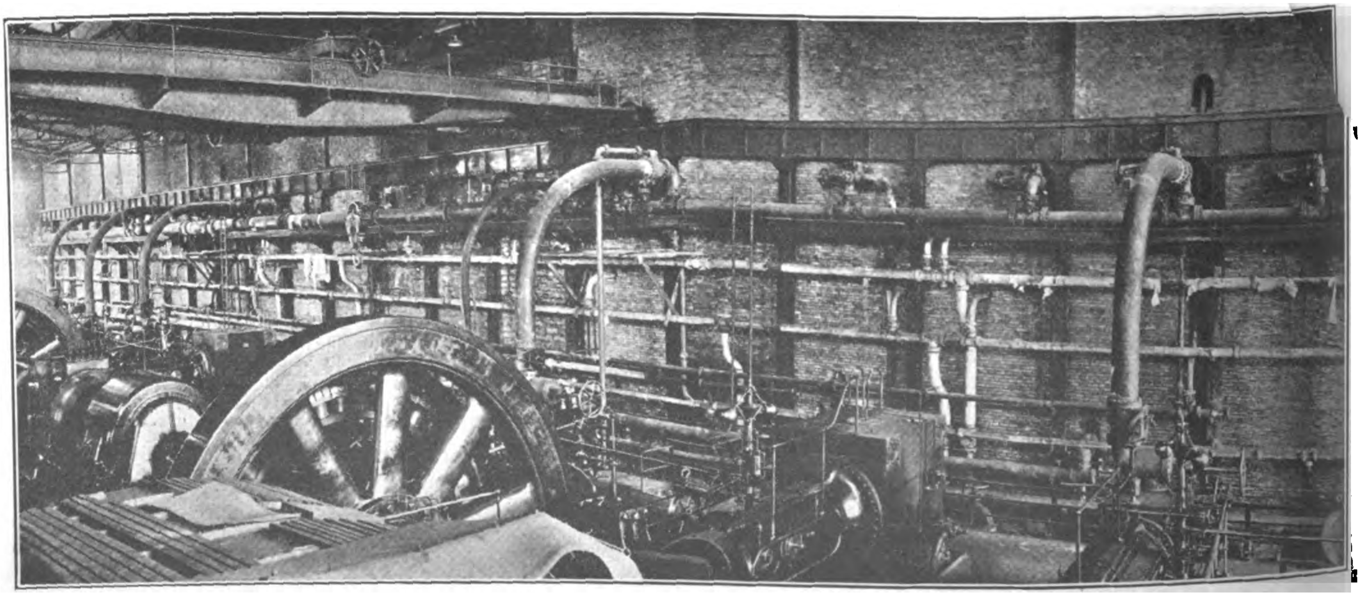
A number of other changes have been made in the boiler room, such as the installation of d.c. motors to drive the forced-draft stokers, fans and damper machines; the design and installation of coal spreaders in some of the stoker hoppers to cut down the labor cost of firemen and to produce uniform fuel beds; installation of recording meters and draft gages, including a trial installation of the Lea recording coal meter to give a continuous boiler check on pounds of steam per pound of coal.

Eight superheaters were installed to obtain decreased engine and turbine water rates possible with superheated steam at approximately 550 to 600 deg.

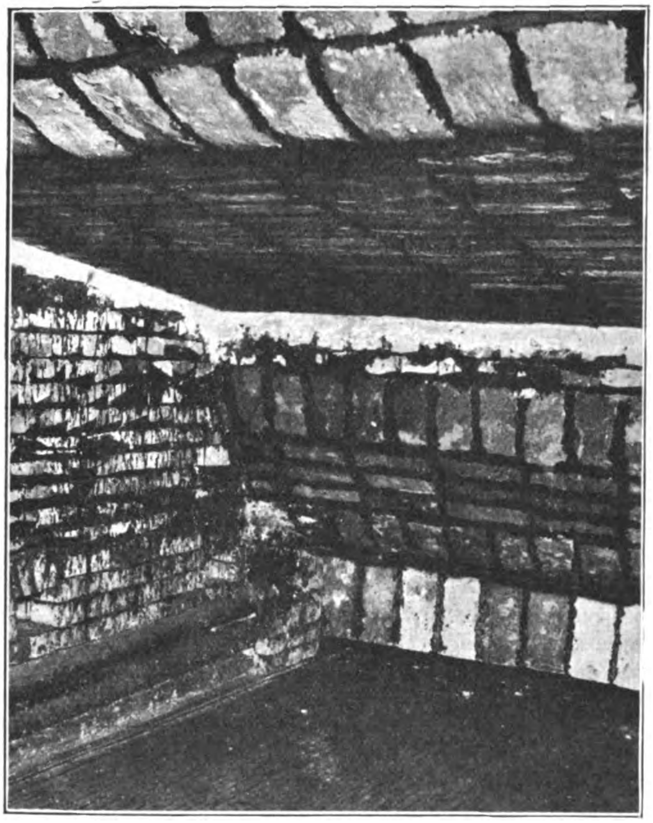
A large portion of the pneumatic ash conveyor system was replaced with a new steam-jet system for the purpose of reducing operating and maintenance costs. White iron ash conveyor pipe 1 in. thick was used, with a joint somewhat resembling Vanstone construction. Five boiler water deconcentrators and a feed water filter in the make-up line were installed to minimize boiler cleaning and upkeep expense. All cast-iron fittings, valves and screwed flanges in the boiler and engine leads were removed and replaced with steel fittings and valves and Vanstone flanges to withstand superheated steam.

Heat insulating materials were used to cover all steam and hot water lines, boiler drums and heads, etc., to cut down the heat losses in transmission.

The 7,500-kw. turbine was completely rebladed and repaired to place it in efficient operating condition, and the cast-iron head was replaced with a new steel head



Cast-Iron Valves and Fittings Were Replaced by Steel Parts in the Engine Room



Interior View of Furnace Looking Toward the Arches

to permit the use of the increased temperature. A desuperheater and attemporator were designed and constructed for the purpose of automatically maintaining the temperature in the main steam header opposite the reciprocating engines at a point not in excess of 500 deg. F. at all conditions of flow.

The turbine-driven hydro-flow air pump on the main turbine condenser was replaced with a twin two-stage steam-jet air removal pump with inter and after condenser and the consequent halving of steam consumption necessary for air removal. A small automatic dual drive exciter set was installed for the purpose of constantly and automatically maintaining a station heat balance. A 750-gal. per minute boiler feed pump driven by a variable-speed motor was installed with automatic constant pressure differential speed regulating control. Under the load conditions prevailing computations proved a power saving of 17 per cent by the use of speed regulating control of the motor as compared with throttling control of the pump.

The station bus was redesigned and reinforced, as were the cables and wiring, the present output having outgrown the capacity for which they were designed.

A 1,000-kw. frequency changer was added to permit handling additional 60-cycle commercial load until an increase makes necessary additional 60-cycle generating capacities. Two 1,000-kw. full automatic rotary converter substations were also installed, with all necessary equipment, making possible faster and more frequent railway schedules at a minimum expenditure for labor.

In addition to the major items there were scores of minor changes, repairs and additions effected. All boilers were turbined and washed and a fixed cleaning schedule established. Masonry in furnaces and settings was placed in first-class condition, all steam or water leaks were sought out and eliminated, valves were repacked and ground, auxiliary turbines, engines and motors repaired and placed in first-class operating condition, main engines gone over in detail and completely rehabilitated wherever necessary. A complete new system of power house logs and accounting was introduced, which makes possible a much more accurate prediction of the annual maintenance budget or subsequent new construction budgets.

As not all the items of new equipment are yet in service, nor has the operating personnel yet had time to become so intimately acquainted with all details as to be able to say what maximum results are to be obtained, definite figures just at this time are not available. The general conclusions stated at the beginning of this article have, however, been definitely established.

What It Costs to Operate an Auto

CONSIDERABLE interest has recently been manifested by electric railway men in automobile operating cost figures for use in telling the owners how much they save by leaving their automobiles at home and riding the electric cars. L. S. Cowles, writing in the *Stone & Webster Journal*, gives figures throwing some light on the subject. The following is abstracted from his article:

Any driver knows that with "gas" at 20 cents per gallon and his car making 10 miles per gallon the fuel cost is 2 cents a mile. Beyond this, few care or take the trouble to go. When you see a Pierce-Arrow roll by with a chauffeur at the wheel, you may know at once that such an outfit is costing the owner from 50 to 60 cents per mile traveled. For small annual mileage, say 4,000 miles, the cost per mile may easily exceed $1. Few would believe this without analyzing the situation carefully. A few exact figures bearing on the actual cost of operating one particular car will enable one to get some idea of operating and maintenance expense.

ANNUAL STATEMENT OF MOTOR CAR OPERATION
June 11, 1922, to June 11, 1923

Make	Buick
Model	22-44
Type	Roadster
Total miles traveled	6,114

Operating and repair cost (not including replacements):

Interest	$35.61	Two bottles body polish	1.45
Depreciation	355.02	Cheesecloth	.15
Registration	10.00	One can leather dressing	.75
Driving license	2.00	One can nickel polish	.90
Fire and theft insurance	12.50	Distilled water	.10
Liability insurance	46.69	One flashlight bulb	.20
Personal property tax	22.56	Three 21-cp. lamp bulbs	1.50
16.75 gal. engine oil	15.91	Three 2-cp. lamp bulbs	.90
405 gal. gasoline	113.95	12 lb. grease	2.60
Two carbon burnings	9.00	1.75 gal. alcohol	1.50
Repair labor	74.18	One roll friction tape	.35
Tire repairs	6.65	Two flashlight batteries	1.00
1.75 gal. transmission oil	1.82	Battery charge	1.20
Tire powder	.20	Cotton waste	.90
One can "tar remover"	1.00		
		Total	$720.59

Cost per mile operated:

	Cents
Fixed charges	6.380
Operating fees	0.196
Insurance	0.970
Taxes	0.396
Fuel	1.865
Lubrication	0.333
Repair labor	1.470
Miscellaneous supplies and expenditures	0.260
Total cost per mile	11.870

From the above it is seen that fuel cost is a relatively small part of the whole. While no one wants to waste gasoline, the question of high mileage per gallon of gas is not as important as one might at first believe. In the case cited no allowance was included for garage rental and car washing, as these vary with the requirements of the owner.

Some Useful Elements of the Street Railway Philosophy

By W. E. Wood

Manager Houston Electric Company, Houston, Tex.

The Real Interests of the Three Groups in the Public Utility Triangle, Public, Employee and Owner, Are the Same — What the Railway Management Should Do to Bring About Real Co-operation

PHILOSOPHY, as such, is generally conceded to be a dry subject, especially for the practical business man. But in our desire to analyze our business so that we may popularize it and administer it more successfully, we have naturally gravitated into a study of its philosophy. Having got into this study, we have been agreeably surprised to find how beautifully the facts we have always known develop themselves in the most logical fashion.

As a basis of our study we have accepted as true two important facts. A proof of their truth will not be attempted here because of the space that would be required, but surely we could not so earnestly continue to pursue our business if we did not believe them to be true. The assumptions are these:

1. In the heart of every human there is a spark of reason and justice that is capable of being fanned into a flame under proper condition.

Within this assumption lies our hope of obtaining the popular co-operation so essential to a successful operation of our business, for while it is true that we may temporarily lull our public into a quiet state of mind or even make them enthusiastic for us by catch phrases, attractive publicity and the like, if our basic arguments are not founded on "justice and reason," eventually these efforts will surely fail. Then the enthusiasm aroused in our favor will react with most unwholesome results. But if this enthusiasm is based on justice, reason and sincere efforts it is on the firmest foundation on which our industry can stand.

2. Up to the present time private ownership and operation have been capable of rendering street railway service more efficiently and economically than has municipal ownership.

THREE DISTINCT GROUPS INTERESTED IN EVERY PUBLIC UTILITY

Having accepted these two assumptions as true we should next make a careful analysis of the public utility triangle.

There are three and only three distinct groups interested in each public utility. The public, the employees and the owners.

It should be beneficial to determine in what each of these groups is interested and what each may properly expect to receive from the business and from each other.

The Public: By virtue of the fact that the public through its constituted authorities has granted to the utility the right to use certain portions of its property in the transaction of its business, it has a right and does desire and expect to receive from the utility the best practicable service at the lowest possible cost.

The Employee: It is an accepted theory in this country that all employees are entitled, for proper performance of their duties, to receive, and it is their natural instinct to be interested in, fair wages and proper working conditions.

The Owner: Capital is essential to the construction and establishment of public utilities. There could be no reason why any one should become interested in acquiring or investing in public utilities unless he can reasonably expect the capital he so invests to earn a fair return.

So we find three separate and distinct interests, each apparently having a right to expect to derive some distinct benefit from the operation of the utility. Their interests may appear divergent, but a study makes it certain that for each to receive the greatest possible permanent individual benefits their interests must be unselfishly mutual.

The history of our industry clearly indicates that the public and employees will persecute the owners of a utility when they discover that the owners are receiving more than a fair return. Therefore it is to the owners' best self-interest, when the returns exceed a fair amount, with wages and working conditions all that they should be, to return the excess to the public in better service or cheaper rates.

If the public insists on getting its service cheaper than will yield the owner his fair return and the employee his fair wage and working conditions, the utility must fail and ultimately cause the public to receive an inferior service which necessarily becomes more and more expensive to operate. During the period of rising prices of wages and material, caused by the recent war, it was very hard for the public to realize that the above was a fact; however, its truth is becoming more and more apparent to the public every day.

Should the employees of a public utility demand and obtain more than a fair wage and working conditions, either the rate of fare of the service of the public must furnish this excess or it must be taken out of the owner's fair return. In either event the result would ultimately defeat its own purpose.

MUTUALITY OF INTEREST BETWEEN GROUPS

We have recited a few instances which tend to demonstrate the mutuality of interest of the three groups interested in the public utility. Like the axioms in geometry, this fact is so clear and apparent that it is difficult to prove.

The public's manner of expressing its approbation or dislike for the owner or employee is through public attitude.

The employee's method of showing his interest for the owner or public is through loyalty.

And the owners express themselves through their policies.

Believing, as we do, that there is a distinct and invariable mutuality of interest between the groups, then why is there so often controversy between the groups? Employees and owners are frequently at odds. Employees and the public sometimes entertain a healthy disrespect and dislike for each other, and in the immediate past instances of antagonism between the owners and the public were continually arising. Our reasoning shows that such conditions are contrary to the best interests of all concerned. To eliminate them we must first determine their causes.

IMPROPER POLICIES AND LACK OF UNDERSTANDING CAUSES FOR DISAGREEMENT

There seem to be two major reasons why the public's attitude toward the owners is hostile or the employees are disloyal to the owners:

First—The formulation and maintenance of improper policies by the owners toward the public or the employee.

Second—Lack of understanding.

These causes seem to cover every case both in connection with the public's attitude and loyalty of employees. As a rule, where the public attitude is the most favorable, the employees are the most loyal. In this case the owners' policies necessarily approach right, and there is little lack of understanding.

In some cases the employees are loyal yet there is an unfavorable public attitude. This indicates that the owners' policies point right but that the public lacks the understanding of the situation which it has been possible to convey to the employees. In every case it must be remembered that the employees' loyalty is weakened by improper policies toward the public and the public's attitude is adversely affected by the improper policies of the owners toward their own employees.

Continuing the analysis, we find that the owner should weigh his policies to the public in respect to service, publicity, citizenship and expansion.

The owners' policies toward the employee include wages, working conditions and welfare work.

All of the phases are susceptible of a most interesting further analysis.

Now, if the owners' policies toward both the public and employees are right, fair and just, then certainly, if our first original assumption is true, and in some manner we can convince the public of the fairness and justice of our policies, the antagonism will begin to disappear.

Lack of understanding can only be wiped out by the education of both the public and employees concerning utilities in general and the specific utility concerned in particular.

COMPONENTS OF SERVICE

We are studying the street railway business, the most important feature of which to the public is service, therefore special care should be taken in analyzing our service.

Service is composed of: (1) Safety, (2) quantity, (3) personal service (commonly called courtesy), and (4) cleanliness and comfort.

Safety is the first and most important component of street railway service. When we do not make it so, our widespread catch phrase "safety first" is insincere and therefore a cause of public disrespect. There are so many phases to the study of safety that although most interesting and important, it cannot be considered here.

By quantity of service we mean the amount, frequency, regularity and speed. It should be unnecessary to point out to any street railway man the importance of having an entirely sufficient service with as excellent a standard as possible. It is equally our duty to the public to be sure that this service is rendered as economically as possible in order that it may be given "at the lowest possible cost."

PERSONAL SERVICE RENDERED IS DIFFERENT FROM THAT IN OTHER UTILITIES

The third component mentioned of railway service is personal service. Although we have barely pointed to the importance of safety and quantity of service, we must not in the slightest degree minimize their importance. Service is like a three-legged stool standing on safety, quantity and personal service. If deprived of any of the three legs, it cannot stand. It is difficult to say which leg is the most important, but for fear that the usefulness and spirit of "personal service" may not be fully appreciated we will inquire into this phase more minutely.

To understand to the fullest the place of personal service in street railway service, it is necessary to digress sufficiently to study street railway psychology as compared with that of other utilities. For the greatest contrast we will compare electric lighting with street car service. One enters a dark room and wishes light. A switch is located in the room convenient to the entrance. With a minimum of effort the button is pressed and instantly the room is lighted, and the person unconsciously feels a sense of satisfaction. Psychologically there is nothing in the operation that would prepare his mind to harbor any ill feeling or mistrust for the lighting company. He knows of no substitute at any cost that is comparable in convenience or satisfaction.

But picture a modern man, our friend Bill Jones, a regular patron of the street car service on an ordinary morning's ride to his office. Mr. Jones may or may not be the possessor of an automobile, but surely he is fully acquainted with the comfort and speed they offer and besides can easily forget their small disadvantages. Possibly his family has started him a little late to work. He has to walk two and a half blocks to the car line. Although there is no particular objection to this, he doesn't relish it every morning. He has to wait four minutes for a car, not an unreasonable wait but seemingly much longer, and distasteful. The street car maintains a good average schedule speed to town, but automobiles pass it and, darting in and out of traffic, weave their way to the city in less time. Somehow, the occupants of the automobile look more comfortable to him than he feels. At times a broken truck may delay the street car. Bill Jones is not an unreasonable man, but under these conditions the street car ride furnishes him no real sense of satisfaction and very probably his mind is prepared to entertain some ill feeling or mistrust for the street car company.

So we find that very few people will get pleasure out of street car riding even when the safety and quantity are above reproach. But all is not lost. We have a most effective way of preventing this ill feeling and mistrust from capturing Bill.

By the use of what we have called personal service, even under the conditions mentioned, we can gain his respect and very frequently his active co-operation. The lighting has practically no human contact with Bill, but the street car company has, every time he uses its service. We have commonly called this phase of our business "courtesy." But sincerely based on the golden rule our organization, if it is permeated with the spirit of personal service, can effectively win over Bill Jones. The definition of personal service is:

Those acts of kindness, courtesy, accommodation, attention, favor, respect and consideration which we may render to our fellow man in connection with our business.

Personal service tends to gain a favorable public attitude for the company. For the employee it makes individual friends, creates self-respect, gives the satisfaction of a duty well performed and makes his work more pleasant.

Besides this, if the company's policies are right (and if they are not, the spirit of personal service will be difficult to obtain), this spirit is the surest way of obtaining real co-operation in the utility triangle. Therefore, if there is a mutuality of interest the employees will ultimately be rewarded by better wages and working conditions. We might add, however, by way of warning, that if the personal service is rendered primarily in the hope of a material reward without a sincere desire to live up to the golden rule, it is not likely to be effective enough to gain the material reward.

CLEANLINESS AND COMFORT THE FOURTH COMPONENT OF SERVICE

The fourth component of service mentioned was cleanliness and comfort. Although these may not be as important factors of service as the three others, we feel that their necessity is apparent enough without further argument.

For fear of exhausting the patience of the reader no attempt will be made here to analyze the other factors of the owners' policies to the public, namely, publicity, expansion and citizenship, or to the employee, which can be summed up under the headings of wages, working conditions and welfare. It is necessary clearly to understand the public's and employees' rights and the company's obligations in these respects to "formulate and maintain the proper policies."

REAL CO-OPERATION NECESSARY

What we have tried to accomplish is to show the relationship between the three groups interested in the public utility; to prove an absolute and unchangeable mutuality of interest between these groups, which in turn means that for their own interests there must be a real co-operation between the groups. And, lastly, we have tried to analyze the things the owner, through its management, can and ought to accomplish to bring about this mutual understanding and co-operation.

If we can render a better service more cheerfully by understanding this philosophy, is it not necessary for us to teach and preach it throughout our organization until every one of our employees can better perform his daily duty because he understands how to and believes in the necessity of winning the public?

Concrete Paving of Track in Chattanooga

Tennessee Power Company Is Installing Concrete in Track Area with Excellent Results—Ballast Is Tamped Under Traffic

WITH a view to securing permanently satisfactory results with concrete paving in and between tracks, the Tennessee Power Company, which operates the city railway lines in Chattanooga, Tenn., has lately used the track construction shown in the cross-section, Fig. 1.

The trench for the single track is 9 ft. wide and the bottom is inclined toward a 12-in. x 12-in. drainage ditch in which a 6-in. farm tile is laid. If the soil is soft, 2 or 3 in. of ballast is rolled into the bottom. The trench is about 22 in. deep at the middle and 2 in. less at the outside. Broken stone ballast is laid in the bottom to a depth of 8 in. at the middle, on which white oak ties creosoted by dipping one hour in hot oil and one hour in cold oil are laid. Standard 6-in. 100-lb. A.R.A. rail is spiked to the ties.

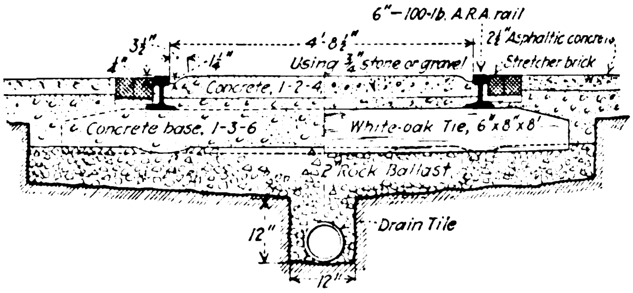
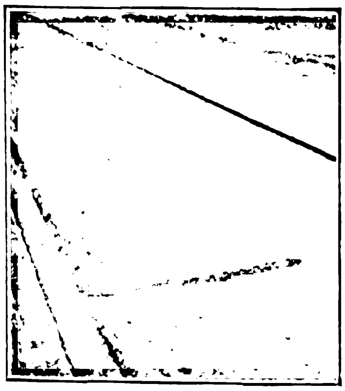


Fig. 1—Typical Cross-Section of Track for Paved Streets with Concrete Paving Used in Chattanooga



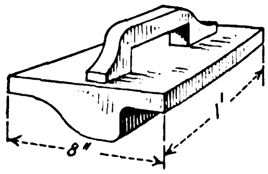


Fig. 2—Grooving Tool for Use in Forming Flangeway in Concrete Paving

Concrete Track Paving in Chattanooga Like that Shown at the Left Is Turning Out Well

A concrete paving base with a 1-3-6 aggregate mixed one and one-half minutes is poured between and over the ties, covering them to a depth of 2 in. The concrete base is deepened slightly under the rails by scraping out the ballast before the base is poured.

The paving base is made about 9 in. deep outside of the rails, where, as in the case illustrated, an asphaltic concrete paving is to be laid by the city. Outside the rails the concrete is depressed to accommodate two or more rows of stretcher brick, which are laid on a sand cushion.

The concrete between the rails is 4 in. deep, of 1-2-4 concrete mix, surfaced as indicated in the cross-section.

Contour strips of wood are laid in the rail flangeways while the concrete is soft, and the surface is smoothed by means of a level board. The surface is not crowned. After the concrete has hardened sufficiently to "stand up," the flangeway is smoothed by means of a special grooving tool shaped in the form shown in Fig. 2.

Expansion joints are placed 15 ft. apart, a space ¾ in. wide at the top battered to ½ in. at the bottom being left for this purpose. A board with the proper taper is used in forming this joint, and the concrete is mixed with as little water as possible to enable it to stand up when the expansion joint board is removed.

After the removal of the board, a grooving tool, such as is used by sidewalk layers in marking lines in concrete surfaces, is drawn through the groove, slightly rounding the edges. Pitch is poured into the joint after twenty-one days.

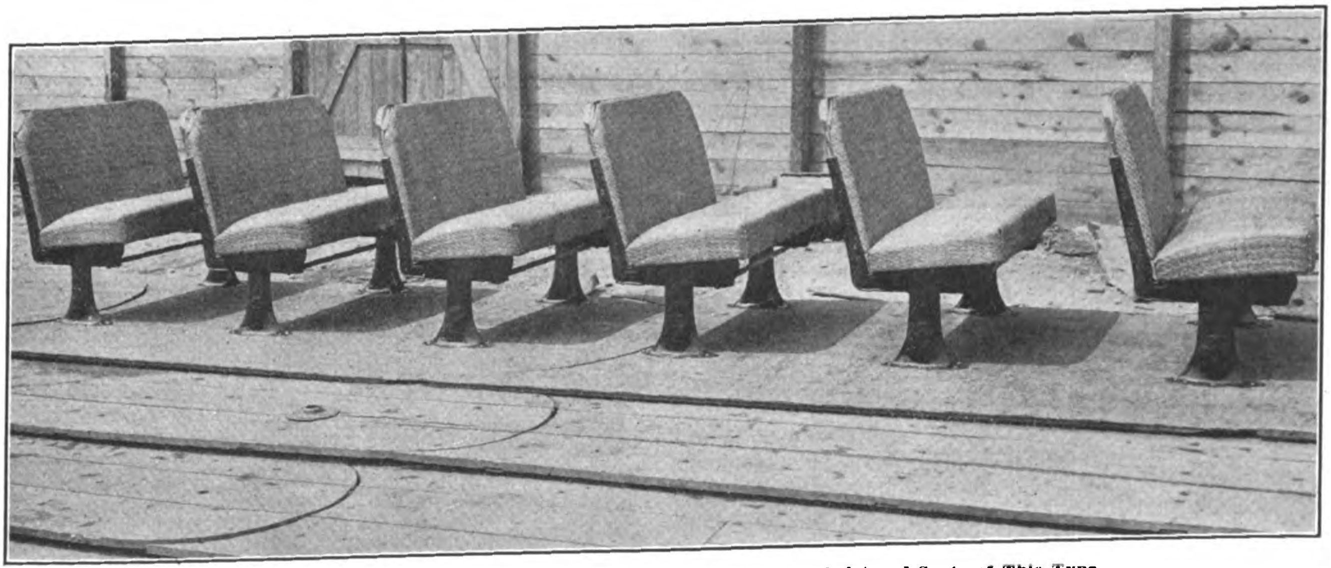
The concrete paving and the ballast tamping are done under traffic. Sometimes ten tampings of the ballast are needed when the ground is soft. The tamping is done with ordinary hand picks. Care is taken to see that no flat-wheel cars go over the line while the concrete is setting, and all cars are run during this period at reduced speed.

For the first seven days the concrete is continually wet down to permit uniform setting.

The cost of this work was from $1.25 to $1.50 per yard on two recent jobs on Walnut Street and Harrison Avenue. This work was carried out under the direction of R. C. Morrison, engineer maintenance of way Tennessee Power Company.

Moving Platform Tests Show Low Power Requirement

A Demonstration Plant of the Type of Platform Recommended for Forty-second Street, New York, Has Been Built for Tests and Demonstration Purposes

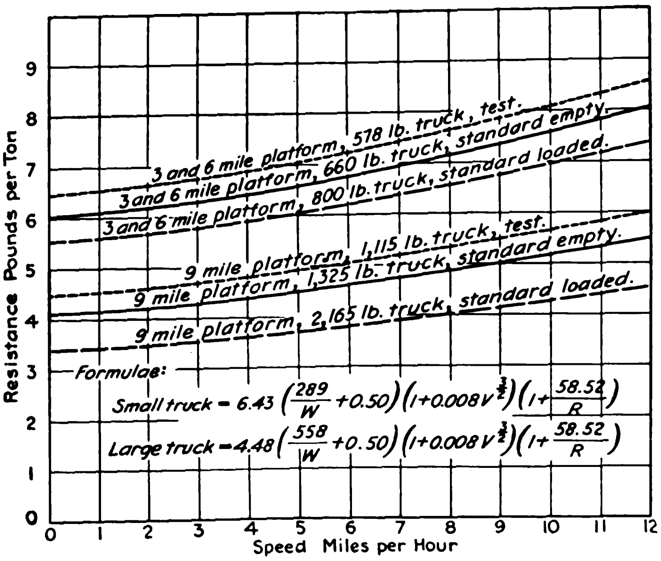


A Short Section of the Platform Has a Steel Surface and Upholstered Seats of This Type

A SERIES of dynamometer tests has recently been concluded on a demonstration plant of the type of moving platform considered by engineers of the New York Transit Commission for use under Forty-second Street in place of the present shuttle train service. This demonstration plant has been built in Jersey City by the Continuous Transit Company, of which H. St. Clair Putnam is president.

The demonstration plant is constructed in the form of a loop approximately 200 ft. long and 100 ft. wide, with a 50-ft. radius at each end. It consists of three parallel continuous platforms designed for operation at 3, 6 and 9 m.p.h. respectively. The high-speed platform is 57 in. wide, is provided with seats spaced 32 in., holding two passengers each. At 9 m.p.h. this gives a total seating capacity of 35,640 per hour. Each of the lower-speed platforms is 27 in. wide, and there is a stationary walkway path alongside the slowest platform. The total width of the three platforms assembled is 9 ft. 3 in., and the height above the rail is less than 12 in. Each loop is made up of a series of small trucks 8 ft. long with circular ends exactly fitting into each other. The trucks are supported at the rear end by two independent wheels with ball bearings. The forward end is connected to the preceding truck by a universal coupling. The track for the high-speed platform has a gage of 37 in., and for each of the other platforms it is 17½ in.

The general design of the installation is along the lines of a paper read by L. B. Stillwell before the American Society of Civil Engineers on Nov. 17, 1920, and reported in the ELECTRIC RAILWAY JOURNAL for Nov. 27, 1920, page 1102, and Jan. 15, 1921, page 124. The most important change in the present demonstration plant from that description is that only the high-speed platform is propelled by induction motor elements, the other two being driven by racks and pinions. With the induction motor type of drive a stationary element is placed between the rails. This consists of a development of the ordinary primary or stationary part of an induction motor, as shown in the illustration. These sections are approximately 5 ft. long and are placed between the rails in groups about 140 ft. apart. The secondary element is similar to the developed rotor of the squirrel-cage type mounted on the bottom of the truck. It consists of a laminated iron core with punched copper windings. Except for the necessary breaks between the trucks this is continuous for the entire length of the platform. The primary is supplied with three-phase alternating current at 37½ cycles per second for a speed of 9 m.p.h. In the demonstration plant the alternating-current generator supplying the propulsion power is capable of drive at variable speeds in order to change the speed of the platforms.

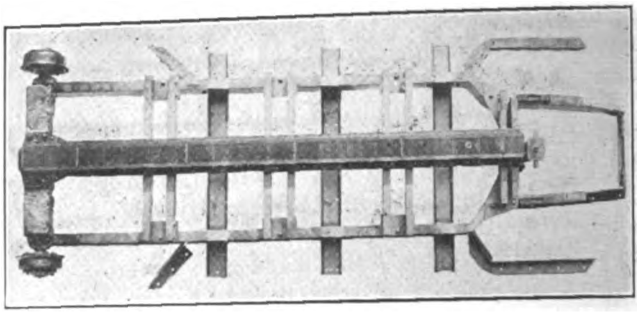


Train Resistance of Moving Platforms on Tangent Track

The two lower speed platforms are similar in type. The racks are continuous, and are mounted on the underside of the platform in the same manner as the secondary element in the induction drive.

In the demonstrations witnessed by representatives of the ELECTRIC RAILWAY JOURNAL, the three platforms have been run at various speeds to determine what will be practicable in service. With the high-speed platform running at 4.5 m.p.h. and the others at 3 m.p.h. and 1.5 m.p.h. respectively no difficulty at all was experienced in getting on or off, or stepping from one platform to the next. This also held true when the platforms were speeded up to 2, 4 and 6 m.p.h. At speeds of 3, 6 and 9 m.p.h., for which the installation was designed, it was necessary to practice getting on or off before facility could be had in it, or in stepping from one platform to the next. It was difficult, however, to trip oneself so that a fall was imminent. It has been suggested that the platforms can be operated at reduced speeds during the non-rush hours, and speeded up for the maximum loads.

The power requirements for this type of platform have been determined from dynamometer tests made by the Electrical Testing Laboratories of New York. Since the platform is continuous and approximately 73 per cent of the track length is curved, this was the only method available to determine the power required for longer platforms of the same type. Tests were made at various speeds in order to determine the train resistance, both on tangents and on the curves. From these tests the train resistance has been worked out, as shown in the accompanying curve sheet.

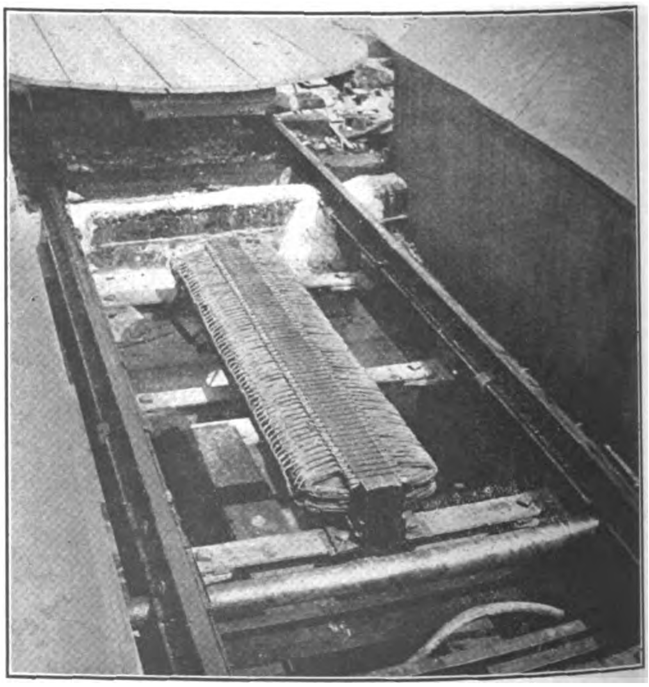


Under Side of Truck for High-Speed Platform, Showing Induction Motor Secondary Element

Average figures show that the train resistance on tangents of the high-speed platform at 9 m.p.h. is approximately 5 lb. per ton empty, and 4.1 lb. per ton fully loaded. The other platforms have a resistance of approximately 6.3 lb. per ton at 3 m.p.h. and 6.7 lb. per ton at 6 m.p.h. when empty and 5.8 lb. per ton at 3 m.p.h. and 6.2 lb. per ton at 6 m.p.h. when fully loaded. It is not expected, however, that large numbers of persons will desire to ride on the slower platforms. The resistance on curves is from two to two and one-half times the tangent resistance.

It is stated that this low train resistance is due largely to the use of ball bearings and independent wheels and to lubrication of the rails. It has been found that this reduces the frictional resistance to a material degree. Rail lubrication is of course possible in the case of an installation of this kind, since the rails are not used for traction.

The average resistance of three loops of moving platforms 2 miles each way in length, which would be required for the Forty-second Street installation, is 6 lb. per ton including curve resistance. The average resistance under maximum load conditions is 5.13 lb. per ton, including curves.



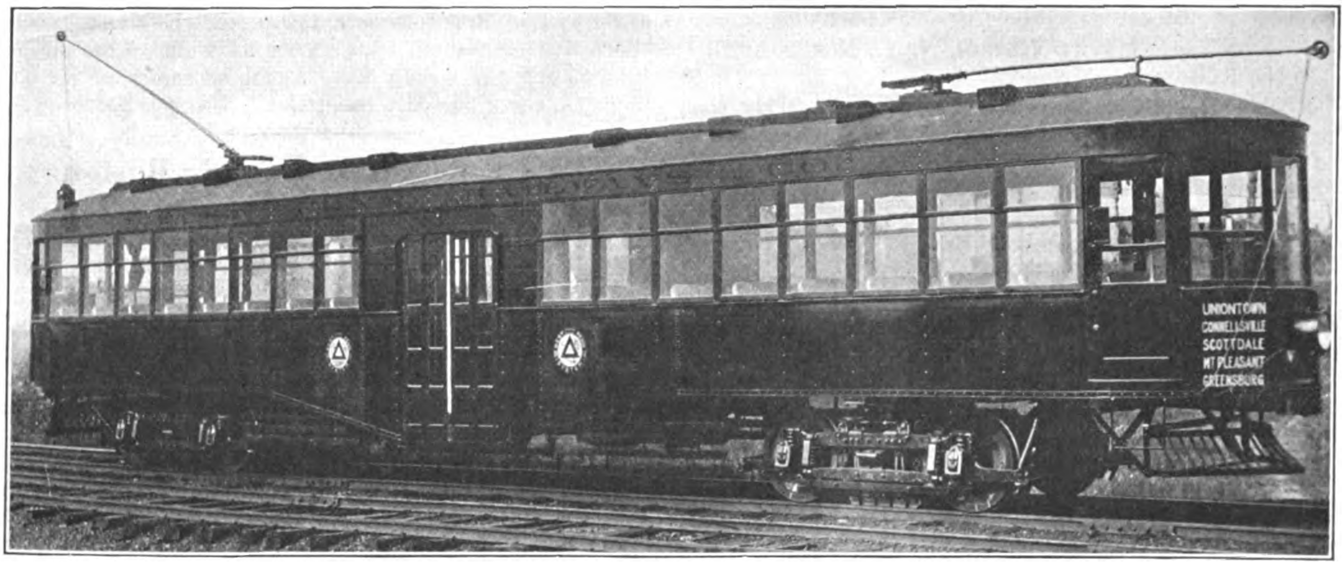
Three-Phase Induction Motor Primary Windings Are Placed Between the Rails

Since there is no power needed for acceleration except at such times as the platforms have to be started, the only power requirement is that for overcoming the train resistance. Running at constant speed the power per mile for the three platforms unloaded is 91 hp., and 114 hp. per mile for maximum load conditions is needed. On this basis the complete double-track loop, required for Forty-second Street, would take 364 hp. unloaded and 456 hp. loaded.

West Penn Center-Door Cars Successful

Interurban Service in Difficult Pennsylvania Section Much Improved Through Use of This Type of Car—Details of Construction and Equipment

A MATERIAL saving in the time required for loading and unloading passengers is the chief advantage found by the West Penn Railways in center-door cars for interurban service. Cars of this type are in use on the 40-mile line between Uniontown and Greensburg, as well as on 95 miles of shorter routes on the Coke Region division, and have proved to be much more satisfactory than the end-door cars formerly operated.



This Type of Interurban Car Has Proved Superior to Earlier End-Door Cars on the West Penn System

Physical difficulties of railway operation are great in this territory, due to the fact that it lies among the foothills of the Allegheny Mountains. Grades in some cases are as steep as 12 per cent. Careful operation and strict observance of the rules on the part of employees is necessary for the safety of the passengers and the maintenance of scheduled speed. Stops are well spaced, and attention has been given to the matter of increasing the speed of passenger interchange. During recent years the number of cars on time has averaged from 96 to 98 per cent of the total cars operated.

The West Penn Railways was one of the first companies to use center-door cars in interurban service. In 1910 an experimental car designed by W. E. Moore, general manager, and Daniel Durie, superintendent of equipment, was placed in service. While the original car was crude in a good many details, nevertheless from it has been developed the present standard interurban car of the company, which is thought to be ideal for the particular conditions prevailing in that territory. All the subsequent cars of this type have been built in the West Penn Railways shops at Connellsville.

The first cars of this type were built with a large two-part two-leaf folding door controlled by a hand-operated mechanism from the center compartment. In the later equipment the door is the same except that it is set flush with the sides of the car and is electrically operated by a Westinghouse 1/12-hp. 250-volt motor. All grab handles close inside of the car, and the doors on either side may be operated from any position within the car. Each door has an independent motor with a cord connection to the operating switch. A three-way snap switch to change the cord control from one door to the other has been installed. Besides these, each door has an independent lever by which it can be manually operated.

The length of the car is 58 ft. over bumpers, and the seating capacity is seventy, the general compartment containing thirty-six seats, the smoking compartment thirty seats, and a small compartment at the center having four more. Standard practice has been followed in the construction of the underframe, which is of wood reinforced with steel plates. Side sheathing is made of open-hearth rolled steel. The exterior of the car is painted deep orange, with black trimming. On each side of the center door has been painted the monogram of the company.

The entire interior of the car is finished in cherry except the ceilings, which are enameled in light buff. Artificial lighting is accomplished by thirty 23-watt Mazda lamps, located in two rows, one on each side of the car directly over the seats. The buff color ceiling has been found to be an excellent reflecting surface for these lights.

An outside marker or taillight is a combination of daylight and night stationary fixture with a turning arm inside of the car. Each marker is equipped with green and red glass and a 6-volt 2-cp. lamp on an Edison three-cell 18¾-amp. storage battery. The battery is kept charged by a connection through the headlight resistance. In addition to that a lamp of similar size is placed in the center compartment ceiling to show when the trolley wheel leaves the wire. This also makes it possible for the conductor to keep close track of the marker lights, as they are in parallel with this lamp.

A feature that has been found especially pleasing to the motormen is the front center "clear vision" window. Originally a double glass was used to prevent steaming and frosting during the winter weather, but more recently these have been replaced by a ½-in. French plate glass, which is far superior to the old arrangement. It does not steam nor frost, gives a clear vision, and is much easier on the operator's eyes.

The cars are equipped with Westinghouse magnetic brakes, which have proved to be very efficient. Truck maintenance costs are said to be considerably reduced and flat wheels are practically unknown. With this type of brake wheels have a very high mileage of service, records of more than 350,000 miles being quite common on the West Penn system.

The Readers' Forum

Zone Passes on Flat-Fare Systems

MOUNT VERNON, N. Y., Nov. 9, 1923.

To the Editors:

Any one who gives the principle of the weekly pass serious thought will find a number of advantages therefrom, not obvious at first sight. Among these is the one which Lawrence H. Doolittle has set forth in his communication "The Weekly Pass as a Simple Zoning Expedient," published in your issue of Nov. 3.

If I understand Mr. Doolittle aright, he suggests passes good within certain sections or zones on what to the cash and ticket rider is still a flat-fare system. In other words, if the standard fare were 7 cents we might perhaps have a universal pass at $1 and shorter-distance passes at say 50 cents for one zone and 75 cents for two zones. A passholder who rode beyond the bounds, as Mr. Doolittle explains, would not gain thereby. "What goes up must come down" is still true. The passholder would not be likely to go much beyond his boundary, because on the return trip he would either start or end in the wrong zone and thus have to pay the unit cash or ticket fare. This would give a slight reduction in rate only for the occasional long rides.

This plan would not be feasible, of course, on the many systems where there is a combination like pay-leave outbound and pay-enter inbound. The passholder would buy a one-zone pass good in his suburban area. This he would show on leaving outbound or entering inbound, thereby getting the best of it every time.

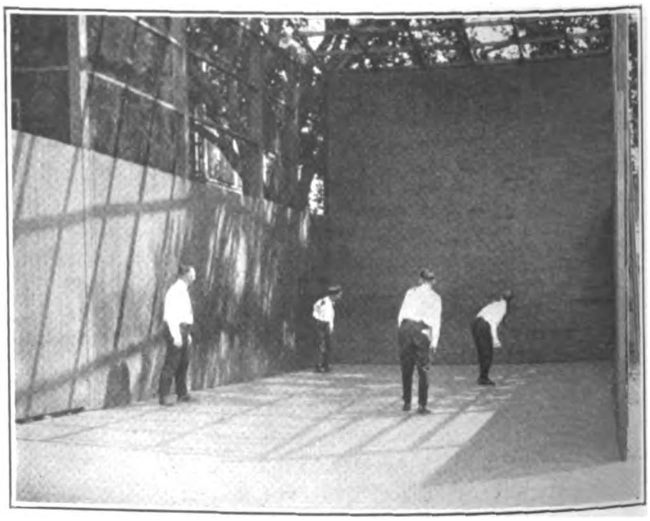
While Mr. Doolittle has arrived at his suggestions independently, the same plan was set forth two years ago in a confidential report by the writer to a rapid transit company. In this instance, it was also proposed to retain the flat fare for cash and ticket riders but to sell both an inner and outer area pass as well as a universal pass. When one of the operating staff pointed out that the holder of the single-zone pass could over-ride without detection on this all pay-enter system, the general manager cleverly retorted that every station over-ridden meant just as many stations to overwalk on the return trip. The company adopted the pass plan, but refrained from installing the single-zone short haul pass for reasons of policy.

As a student of pass installations, Mr. Doolittle may be interested to know that the distance principle is in effect on at least eight installations in this country. In all these cases, the price of the pass has been shaded downward as the average length of haul increased and the probability of repeating full-length rides decreased. On several of these installations the character of fare collection is such that a passholder could readily over-ride if he wanted to do so, but the fare collection plan automatically minimizes this for the reasons noted hereinbefore. Even in those instances where the cash and ticket fares are zoned, abuse is minimized by the fact that the difference in price between passes is too small to encourage the practice of over-riding one way and paying the cash fare between boarding place and the boundary of the section within which the pass may properly be presented. For instance: With one pass costing $1, the other $1.25 and the cash fare 10 cents, it would not pay to do this more than twice a week.

There is no question that short-haul passes would bring more short-haul fares. They do so on the Beaver Valley Traction Company's system, where some of the passes cover sections having no exact relation to the cash fares. They also bring more short-haul fares on systems like Bradford and Doncaster, England, where there are short-haul cash fares as well. The job of introducing the weekly pass would be easier if we had more converts like Mr. Doolittle. WALTER JACKSON.

Men Take to Hand Ball in Boston

THE Boston Elevated Railway has constructed a hand ball court in the rear of several of its division headquarters. It is found that the men take a great deal of interest in this game and by its exercise acquire agility and other physical qualities very useful in their daily work. An advantage of the game is that it can be played for a short or long time, as may be desired. Another advantage is that it can be played in winter as well as at other times of the year, if only a little trouble is given to removal of snow in the court.



The Hand Ball Court, a Popular Place for Exercise Between Runs in Boston

The hand ball courts in Boston are laid with a concrete floor and cost from $1,000 to $1,500 each to install, depending upon conditions. Four or five have been built, and it is the policy of the company to erect them whenever a carhouse is rebuilt, if there is sufficient ground for their installation.

Association News & Discussions

Relations Between Motor Bus and Trolley Car Outlined

National Chamber of Commerce Committees Issue Long-Awaited Reports on Economies of Transportation by the Various Agencies

EARLY this year, it will be remembered, President Julius H. Barnes of the United States Chamber of Commerce appointed five special committees of the chamber to report on various topics in connection with transportation. It is the intention to call a transportation conference at which these reports are to be considered. The topics selected for these committees were: (1) Governmental relations to transportation; (2) railroad consolidation; (3) readjustment of relative freight rate schedules; (4) highways and motor transport; (5) co-ordination of rail and water service.

As will be noted, the report of Committee 4 is the report of closest relation to electric railway companies. The report of this committee has just been made public, as has also a report of a special joint sub-committee, appointed by the chamber to consider the subject of the taxation of transportation agencies. Abstracts follow of the portions of these reports of particular concern to electric railway companies.

Relation of Highways in Motor Transport to Other Transportation Agencies

The committee appointed to consider this subject represented all branches of transportation service and was made up as follows: Alfred H. Swayne, chairman, vice-president General Motors Corporation, New York; W. J. L. Banham, general traffic manager Otis Elevator Company, New York; L. W. Childress, president Columbia Terminals Company, St. Louis; D. C. Fenner, engineer and manager Public Works Department, Macks Trucks, Inc., New York; Gerrit Fort, vice-president Boston & Maine Railroad, Boston; Philip H. Gadsden, vice-president United Gas Improvement Company, Philadelphia; W. H. Lyford, vice-president and general counsel Chicago & Eastern Illinois Railway, Chicago; Ralph H. Matthiessen, president Motor Haulage Company, New York; John D. Miller, president National Milk Producers' Federation, New York; H. H. Raymond, president Clyde Steamship Company, New York; Arthur T. Waterfall, vice-president Dodge Brothers, Detroit; Henry J. Waters, editor *Weekly Kansas City Star*, Kansas City; R. C. Wright, general traffic manager, Pennsylvania Railroad, Philadelphia.

In the introduction to its report, the committee, after referring to the rapid development of the passenger motor car and the motor truck, says that inevitably this rapid growth of a new transportation facility has had its effect on the old facilities. Inevitably there has been, and still is, misunderstanding and conflict in the fields of the old and the new facilities, and the old ones are only at the beginning of a readjustment of their activities to meet the new conditions. Meanwhile, the new facility, with inadequate organization and often with little knowledge of its own operating costs, has, in some cases, attempted to handle traffic for which it is not fitted, thus producing an incorrect popular impression as to its proper rôle in our national transportation system. There is already evidence of a tendency to a better understanding of this rôle and toward increasing co-operation of the motor with all other carriers. The present report points out ways further to effect this co-operation. ways in which this co-operation can be effected.

RÔLE OF THE MOTOR TRUCK WITHIN THE TERMINAL AREA

There are three principal directions in which the motor truck can serve to relieve the present terminal situation. These are:

1. By organized cartage instead of the present go-as-you-please method of receipt and delivery at the rail terminal; further than this, by store-door delivery, which is the real completed transportation.
2. By a substitution of motor service for a part of the rail service. This would cover trap car l.c.l. freight service to industries and in a large measure similar movement in interchange as between local stations.
3. By complete elimination of certain rail service. This would cover intra-terminal movements, such as movements between industries or different plants of the same industry within the terminal area, which would then be handled by motor truck.

RÔLE OF THE MOTOR TRUCK OUTSIDE OF THE TERMINAL AREA

The committee believes that where a good highway exists the motor truck has the advantage over the steam and electric railway for distances up to 10 miles in some instances and 25 miles in others, and that beyond 50 miles under certain conditions and 150 miles in others railroads would generally have the field. This leaves a competitive zone with a lower limit of 10 to 25 miles and an upper limit of 50 to 150 miles, with which each form of transportation has certain advantages, and the shipper should be free to make his choice with due regard to cost, time of transit, reliability of service and other considerations. Primarily, the question is one between steam railroad and motor vehicle, but in certain districts, notably in the Middle West and in California, freight movement by electric railways has been highly developed, so that electric railways are interested in this situation, as well as in the question of competition of motor buses in passenger service.

Altogether the estimated ton mileage of the electric railroads in 1922 is approximately 1,000,000,000, as compared with 340,000,000,000 for the steam railroads. Probably the ton mileage by motor trucks considerably exceeds that by electric railways. Because of the greater flexibility of the electric cars compared with the steam train and the lower overhead due to the smaller investment in terminals, the electric railway can in many instances handle package freight profitably for distances below the economic limit for steam railroads, thus widening the competitive zone as between the electric railway and the motor truck. The possibilities in the use of electric railways in the handling of freight have not as yet been fully appreciated, even by electric railway companies themselves, and a large development of this field may be expected in the future.

COMPETITION IN PASSENGER TRANSPORTATION

Competition of the motor vehicle with the steam and electric railways for passenger traffic divides primarily into two classes—that carried by buses and that carried by the private automobile. Whatever inroads the private automobile has made upon the carriers are inevitable and the carriers must adapt themselves to the new conditions. Bus service may be classified as (1) tourists' service; (2) de luxe service in urban districts; (3) non-competitive service; (4) feeder service to rail carriers and (5) parallel competitive service.

There can be little question as to the desirability of free play in the development of motor service for any of the four classes first mentioned. The fifth class, however, offers a more serious problem. The questions to be answered here are: Is the service of the rail carrier adequate and satisfactory to the public? If not, can the rail carrier make it so?

In some fifteen states the Public Service Commission already has authority to grant or refuse to grant certificates of public convenience and necessity to such prospective motor operators. It is wise for the commissions to have this authority as it will afford the existing railroads adequate protection.

The standards by which the merits of any medium of passenger transportation must be judged are:

1. Ability to render safe, adequate and satisfactory service in an efficient manner under all prevailing conditions.
2. Cost of the service.

COMPETITION UNDESIRABLE

There is now quite general agreement on the part of public officials and transportation experts in the automotive and electric railroad fields who have studied the problem that the two forms of passenger transit—motor vehicle and electric railway—cannot permanently exist in a community and pay their way in competition with each other. Furthermore, there exists today an almost unanimous opinion among those who are qualified to judge that the motor vehicle may be used to supplement the electric railway service in such a manner that the transportation needs of the community will be most efficiently met by the provision of a complete system of transportation, under the supervision of a single reliable agency, rather than by individual transportation units.

The problem must be analyzed from the standpoint of the requirements of the entire community. There may be instances where buses, operating in competition with steam and electric railways, have so flourished as to give rise to the feeling that the new medium was the more economical unit. That condition arises primarily because the bus most frequently operates over what may be termed "preferred routes," where the traffic density is greatest and the length of haul shortest, but without regard to the needs of the community as a whole.

On the other hand, nearly every large urban electric railway company has lines which are at present unprofitable to operate. They may reflect bad judgment on the part of an earlier management, or shifting population that has taken away traffic they once had, or they may have been built under public compulsion. In any event, the companies have heretofore been compelled to continue to operate these lines, with a resultant drain upon the revenues from their more remunerative lines and a lessening of their ability to render adequate service to the entire community.

It seems reasonable that in such a case the railroad company should be permitted to substitute bus for rail operation, or that if an independent bus company be granted a certificate of convenience and necessity to operate a parallel service substantially similar in quality, the railroad company should be permitted to abandon the unprofitable rail line.

The Federal Electric Railways Commission, appointed in 1919 to make a nation-wide investigation of the electric railway situation, declares: "It is clearly in the public interest that all common carriers engaged in local transportation service should be required to render adequate and safe service, and that local transportation facilities should be developed in the most economical and effective way from the point of view of the community. Unnecessary and destructive competition ought not to be permitted, and the community at large should conserve the established facility that still is and promises to continue for an indefinite period the principal means of local transportation."

It is believed that the electric railway is the best medium for the mass transportation of passengers, and should be the foundation of the co-ordinated transit system of the whole community.

It is, however, recommended that a thorough study be made of the problems involved in the handling of the transportation of passengers within the terminal areas, with special reference to public and private passenger carrying vehicles.

RELATION OF MOTOR TRANSPORT TO HIGHWAY DEVELOPMENT

The motor truck did not find its place in national transportation until the war, and as it was during that period and the one immediately following that highway engineers were forced to cut down maintenance, it naturally followed that a question arose as to the ability of the engineer economically to maintain the road under the new traffic. Studies of the cost of highway maintenance have been made by the Bureau of Public Roads, in conjunction with the State Highway Departments in California and New York, and have brought to light certain facts in regard to the effect of traffic on road wear. They have shown, for example, that a "light" truck with an abnormal relation between sprung and unsprung weight, a heavy overload, or too narrow or worn tires, may cause much more damage to the highway than a so-called "heavy" truck. Other factors affecting maintenance are comparative density of traffic, speed of travel, width of axle rather than gross load, and the comparative type of the highway and its condition. While a heavier sub-base is being used now in highways, it is impossible to say for how much of this heavier design the motor truck is responsible and how much of it is attributable to the increase in motor traffic of all kinds.

REGULATION OF MOTOR CARRIERS

The committee believes there has been a growing recognition during the past few years of the principle that one engaged in the business of common carrier by motor vehicles should be subject to regulation as to its rates or service just as any other common carrier.

Unregulated competition of motorbus lines with electric railways, or of several bus lines with each other, may temporarily give increased service or lower rates, but inevitably it will result in decreased earnings and a lowering of the standards of service, until one or all of the competitors are faced with ruin. Under proper regulation, intelligently and fairly applied, such as has been adopted in a number of states, the extent to which competition is desirable in the public interest rests with the regulatory body. Destructive rate cutting is prevented, and duly authorized motor vehicle common carriers are accorded the same protection given to other public utilities, this at the same time providing the greatest measure of useful service to the public. Through judicious regulation, and only in this way, will it be possible to obtain efficient, economical and adequate co-ordination of motor transport and electric or steam railroads.

Federal regulation of interstate common-carrier motor transportation has not as yet been adopted, but it is believed that it is necessary.

Municipal regulation of common-carrier motor service frequently interferes with the effectiveness of this form of transportation, particularly where such municipal regulation conflicts with regulation by the state.

The principle of regulation by state regulatory bodies of intrastate traffic has been quite generally accepted in this country, and is believed to be sound as applied to motor vehicle common carriers as well as to other public utilities.

The scope of the regulatory powers of the utility commissions varies widely in the several states. The following outline covers broadly the powers which have been vested in these commissions for the purpose of public supervision of common carrriers:

(a) Power to grant, refuse to grant, supplement and amend the right to operate.

(b) Determination of the amount upon which, in fairness and justice to both the investor and the public, the enterprise should be allowed to earn a return.

(c) Establishment of rates or systems of rates which will yield sufficient revenue to meet all operating and overhead charges, including a reasonable rate of return to the investor.

(d) Power of regulation in respect to all matters affecting conditions and character of service, including extensions and improvements.

The right to operate common-carrier motor vehicles, similar to that to operate an electric railway or other public utility, should be contingent upon the granting of a certificate of public convenience and necessity. In considering an application for such a certificate, the state commission should take into account, as the commissions now do in the states where the motor vehicle is under their jurisdiction, the extent and quality of service rendered by the existing agencies, the desirability of introducing new competition or forcing existing agencies to curtail or discontinue their operations—in short, the public interest in the premises.

If a certificate is granted, the operator should be compelled to furnish ample evidence of financial responsibility or else carry insurance adequate to cover all injuries to persons or damage to property resulting from negligent operation.

Where motor transport, particularly by passenger buses, appears to answer the public need most fully, it is believed that other forms of common carriers should be permitted to install such service as an adjunct to their lines. They are now prevented by the laws of some states, and it is believed that such laws should be repealed.

SIZE, WEIGHT AND SPEED RESTRICTIONS

The enormous development of the motor vehicle, during the past ten years, not only in numbers but also in size and weight, has introduced a number of very perplexing problems with respect to the construction and maintenance of highways and the supervision of traffic on the highways. The increased wear on highways due to the increasing use of heavier and faster vehicles has resulted in the adoption by most of the states of size, weight and speed restrictions.

At the present time there is no uniformity in these restrictions, and this results in serious inconvenience and hardship on individuals and companies operating in more than one state. The weight restrictions in some states are rather indefinite, some specifying gross weight of vehicle and load, enumerating maximum permissible weight on four wheels and six wheels and stating distance between axles, while other states in addition to the above restrict the maximum load per inch of tire. It is believed that there should be uniform size, weight and speed restrictions in all states and municipalities, provided that, where conditions demand, seasonal restrictions, lower than those normally enforced, should be prescribed and administered, under proper safeguards, by the state authority.

CONCLUSIONS

The committee makes extended recommendations, among them the following:

"The best interests of the public and the rail, water and motor carriers lie in co-operation between the various agencies of transportation rather than in wasteful competition.

"To insure to the public continuity and reliability of service, sound financial organization of motor transport is necessary, as well as public regulation of common-carrier motor service.

"Passenger bus transport should be so regulated as to secure the best service to the public, certificates of public convenience and necessity as already required in many states being a useful means of insuring reliable and continuous service. Rail lines can often advantageously extend or supplement their service by bus lines, and in states where this is now prohibited such restrictions should be abolished."

Report on Taxation

The sub-committee appointed to consider this topic was made up of the following: George A. Post, chairman Geo. A. Post Company, Inc., New York; A. J. Brosseau, president Mack Trucks, Inc., New York; Roy D. Chapin, chairman of board Hudson Motor Car Company, Detroit; W. R. Cole, president Nashville, Chattanooga & St. Louis Railway, Nashville; Gerrit Fort, vice-president Boston & Maine Railroad, Boston; Philip H. Gadsden, vice-president United Gas Improvement Company, Philadelphia; W. H. Maltbie, attorney-at-law, chairman committee on special taxes, American Electric Railway Association, Baltimore. An abstract follows:

TAXES PAID BY TRANSPORT AGENCIES

Statistics show that in 1913 the Class I steam railroads of the country paid $118,386,859 in taxes, as compared with $322,300,406 paid out in dividends. In 1921 these railroads paid $275,875,990 in taxes and $298,511,328 in dividends. The taxes exceeded the dividends in 1920 and 1922. The steam and electric railways and motor transport in 1921 paid more than 8 per cent of the nation's total taxes of approximately $9,000,000,000.

In 1921, in addition to these taxes, Class I steam railroads expended $756,413,690 for maintenance of way and structures, charging the sum to operating account. In the same year the electric railways paid in taxes and imposts $92,033,000. In addition they paid approximately $101,000,000 for maintenance of way and structures, charging the same to operating account. Motor vehicle owners paid in 1921 on the vehicles $75,000,000 in personal property taxes, $115,500,000 in special federal excise taxes, $147,000,000 in special taxes applied directly to the construction and maintenance of public highways, and in addition large sums to various municipal taxes, corporation and business income taxes and other property taxes, for which no figures are available.

DIFFERENT METHODS OF TAXATION

Consideration of the different methods of taxation in ordinary use leads to the conclusion that it is impossible to recommend any one of them as ideal or equitable for the taxation of common carriers.

A frequent method of taxation of common carriers is ad valorem taxation; that is, a taxation rate applied to an investment or valuation basis. This is largely an attempt to apply the old general property tax, in use in the early days of this country for the taxation of lands and of simple personal property, to complex and widely distributed economic units, manifestly in form unfitted for such methods of taxation.

It is now admitted by most taxation experts that the most equitable method of taxation for public utilities is that based upon earnings or income.

A graduated tax on gross earnings depending on the relation of net to gross was recommended by the New York State committee on taxation and retrenchment, in its report submitted March 1, 1922. This system has been designated the "gross-net" tax, and the committee recommends it as sound in principle, and one which should be applied to steam and electric railways and as far as practicable to motor vehicle common carriers. The details of such a tax scale would have to be worked out with much care in order that each form of transportation shall bear its just share of the requirements for public expenditures.

Such a tax has the elements of a sound tax, in that it has certainty, reasonableness and simplicity, while at the same time the state in each case will be assured of at least some revenue from each corporation.

This tax as applied to steam railroads and electric railways should replace the multiplicity of taxes at present levied upon them, including federal taxes on capital stock and income, and the various state and local taxes, such as franchise taxes (of different forms in each state), ad valorem taxes, taxes on gross earnings and on capital stock, annual licenses, special franchises, local real estate and personal property taxes. The gross-net tax should replace all of these taxes.

There are undoubtedly difficulties to be overcome in the application of the gross-net tax system. One of these is the allocation to the various political units of the gross and net earnings of interstate carriers on which the tax must be computed. The committee believes, however, that an equitable method of allocation can be devised.

Under the diverse bookkeeping methods employed by the small companies and by individuals who comprise the bulk of the highway transport common-carrier operators of today, practical administration of a gross-net tax is impossible. Pending common-carrier regulatory control which will place the earnings of these carriers upon a comparable basis for taxation, the committee believes that such increases should be made in the taxes now levied against the common-carrier motor vehicle as will bring its charges to an amount equitably proportionate to those that may be assessed against the other carriers.

It is recognized that this recommendation segregates common-carrier motor vehicles not only from private cars which have no gross or net earnings, but also from motor trucks used as private carriers and not subject to public control.

CONSTRUCTION AND MAINTENANCE OF HIGHWAYS

The report then gives the sources of money for the highway program for 1921, according to the United States Bureau of Public Roads, as follows:

AMOUNT AND SOURCES OF HIGHWAY BUDGET, 1921

Source	Amount	Per Cent
Bonds	$417,817,208	39.0
General state and local taxation	381,091,542	43.9
Miscellaneous	88,919,158	
Gasoline tax and registration fees	109,154,226	10.2
Federal and forest road aid	74,679,897	6.9
Total	$1,071,662,031	100.0

Of the $853,844,823, representing all of the money above except that raised by bonds, the sum of $183,000,000 came from special taxes assessed against the motor vehicle and the balance from general and miscellaneous taxation.

Continuing, the committee says that it frankly accepts the motor vehicle as an essential addition to the transportation agencies required in our modern economic life. It follows that improved roads to carry the motor vehicle are equally necessary. These highways are free to the general public, and are built out of general public funds just as are schools, parks and many other improvements essential to the public health and welfare.

In the case of steam and electric railways the investment in roadway is a capital account, and returns on this investment are paid out of income, but on the other hand the steam and electric railways have certain franchise rights in the use of their roadway. Since the motor vehicle derives a special benefit from the improved highway, the committee believes that it should bear the entire expense of maintaining these roads in as good condition as when they were built, even where this involves resurfacing or reconstruction of the same type of road. In addition to a maintenance tax, highway transport common carriers should pay a tax in exchange for franchise rights comparable to those owned by the other carriers.

By paying the cost of maintenance of the highways which it uses, the motor vehicle puts itself on an equality as to maintenance with the steam and electric railways, which pay for the maintenance of their own way and structures through direct charges to operation instead of by taxation.

The committee does not believe, however, that the motor vehicle should be burdened with a special tax for the maintenance of roads not suitable for motor use.

RECOMMENDATIONS

In conclusion the committee makes the following recommendations:

"1. Each form of transportation should bear its fair share of the burden of public expenditure.

"2. Taxation of common-carrier transportation agencies should be simplified as far as possible.

"3. Taxes on regulated common carriers operated for hire should bear a definite relation to gross and net earnings rather than to invested capital.

"4. This requirement can best be met in the case of steam and electric rail common carriers by the imposition of a gross-net tax in lieu of the present levies. Pending full regulation of the motor common carrier, such increases should be made in taxes now levied against it as will bring them an amount equitably proportionate to that which may be assessed against the other carriers.

"5. The entire cost of maintaining the improved highways of the country should be borne from special taxes levied against the road user. Such taxes should be used for no other purpose.

"6. Co-ordination of highway construction and maintenance under centralized administrative agencies is urged to eliminate waste and secure efficiency."

Car Weight, Stability and Tires

AT THE fifteenth annual congress of the Tramways & Light Railways Association, held at Swansea, Wales, on June 21 and 22, W. E. Ireland, rolling stock engineer London County Council Tramways, presented a paper on "Electric Tramway Rolling Stock," dealing with the subject from an engineering point of view. He considered first the desire to produce rolling stock of lighter weight and the factors involved. In regard to double-deck cars, a prime essential was to determine what was to be top-deck load, bearing in mind stability of the car and its ability to resist overturning by wind pressure or by centrifugal force on curves. There had also to be considered strength of pillars, rails, etc., to resist vertical load due to weight of passengers, side stresses and members, the thrusts due to acceleration and retardation. It had to be appreciated that top-deck passenger loads will reach 6,440 lb. or more, added to the weight of the roof cover, say 3,700 lb., making a total of 10,140 lb. Tables were given showing the centrifugal force in pounds in case of a fully loaded car weighing 20 tons at speeds from 1 to 15 miles per hour and on curves of from 45 ft. to 100 ft. radius and total pressure resulting from a wind with a velocity of 60 miles an hour on side of car.

The application of these forces on a car fully loaded on the top deck only was shown, and from this came the deduction that to render the car stable sufficient weight must be introduced into the lower parts to balance forces acting above the center of gravity. The method of locating the center of gravity and determining the weight to be put into the lower parts of the car was illustrated by diagrams. In reference to the forces acting on the ends of the car, Mr. Ireland said that in order to provide a sound foundation and also additional support to vertical members the steel underframe had proved most successful, as it provided the necessary support in both vertical and horizontal directions and rendered the use of a truss rod unnecessary. The parts to resist stresses in their nature determined their own weight. Regarding the top-deck cover, loads were small and stresses limited, so that the structure could be designed in the lightest possible way. With respect to adding sufficient weight to the lower parts of the car to bring the center of gravity to a predetermined position, in some cases it had been found necessary to increase the cross-section of truck sides considerably beyond that required for strength.

Coming to the question of single-deck cars, Mr. Ireland referred to efforts made in America to reduce weight and quoted weights of some single-deck cars in the United States and of double-deck cars in Britain in order to show that the weight per seat was much less in the latter case than in the former. Taking the bogie cars in use in London, Manchester and Birmingham (narrow gage) weights per seat were respectively 423 lb., 393 lb. and 569 lb. A single-deck car, in which the question of stability introduced less complication than in the case of double-deck cars, could be designed in much lighter material than a double-deck car of equal carrying capacity. Mr. Ireland showed a form of body which while giving ample resistance to stresses lent itself to lightness of construction, and also a design for single-deck coupled cars in which the weight of all members would be reduced to a minimum. The body would be supported directly on axle boxes through long laminated springs, with spiral springs between the links and underframe, thus dispensing with the usual form of truck. The motors would be suspended from the underframe and the drive to the axles would be by a silent chain. The axles would be forged hollow, so as to reduce the unsprung weight. The estimated total weight of such a car was 9,520 lb., or 244 lb. per seat. Provision would be made for automatic application of the brake gear in event of cars parting. Two independent systems of mechanically operated brakes were intended to be provided in cases where magnetic brakes were not used.

Mr. Ireland in the last part of his paper dealt with the subject of wear of tires, on which for the last three years he has carried out research work. His conclusions were published in the ELECTRIC RAILWAY JOURNAL Aug. 18, 1923.

Chamber of Commerce Begins Accident Campaign

THE Insurance Department of the Chamber of Commerce of the United States has just begun issuing a series of bulletins designed to assist local chambers of commerce and other civic organizations in conducting accident prevention campaigns. This series has been started on account of the serious public accident situation, which has become worse since the general introduction and use of motor vehicles. According to a statement by James L. Madden, manager of the insurance department, nearly one-fifth of all accidental deaths are now attributed to automobiles alone. The Ford Motor Company reports that of every sixteen fatal accidents experienced by its employees, only one occurs during the performance of duty. The other fifteen are the result of public accidents which the industrial safety measures established by the company do not prevent.

The first bulletin of the series, just issued, gives in considerable detail the activities of the Safety Division of the Milwaukee Chamber of Commerce, which is carrying out an ambitious program for assisting in the development of public and industrial safety. Methods of planning a safety organization and safety campaign are given.

Fall Meeting of the American Welding Society

THE fall meeting of the American Welding Society was held at the Fort Pitt Hotel, Pittsburgh, Pa., Oct. 24-26. In addition to the regular sessions of the society, meetings of the electric arc welding committee and of the board of directors of the American Welding Society were held and several inspection trips were made to neighboring industrial plants. At the industrial application session a paper was presented on the application of welding and cutting to industrial work. This included a description of various classes of work which have been done by the electric arc, oxyacetylene, resistance and thermit welding processes. Slides were shown illustrating practical work accomplished. The methods and illustrations relating to the electric railway field have already been published in previous issues of the ELECTRIC RAILWAY JOURNAL.

Utility Commissioners to Meet at Miami

THE thirty-fifth annual convention of the National Association of Railway and Utilities Commissioners will be held in Miami, Fla., beginning Dec. 4, and will last four days, according to an announcement by President Dwight N. Lewis.

The national association is an organization comprising all the railroad and public service commissions of the different states and the District of Columbia, together with the Interstate Commerce Commission and the commissions of Hawaii, Porto Rico and the Philippines. There is now a regulating commission in every state in the Union excepting Delaware.

The sessions of the convention will be devoted mainly to the presentation and consideration of reports from committees, and will include such topics as public ownership and operation; safety of operation of railroads and public utilities; the questions of service, rates and demurrage; express companies in their relations to the railroads; grade crossings; capitalization; motor vehicle transportation; telephone depreciation; valuation of railroads; and statistics and accounts. A special subject for discussion is the super-power movement, which has gained great headway in the last few years. Herbert Hoover, Secretary of Commerce, who has been one of the leaders in this movement, has been invited to address the convention. The discussion will be led by Hon. W. D. B. Ainey of the Public Service Commission of Pennsylvania.

Representatives of the railroads and other public utilities will be heard during the convention. Addresses will be delivered by Donald D. Conn of the American Railway Association, Carl D. Jackson and M. H. Aylesworth of the National Electric Light Association, J. B. Clumpp, president of the American Gas Association, and James P. Barnes of the Louisville Railway, representing the American Electric Railway Association.

Other questions to be considered will be the regulation of motor vehicle transportation, the valuation of the railroads by the Interstate Commerce Commission, elimination and protection of grade crossings of railroads and telephone depreciation.

American Association News

Bases for Valuation Compared*

By L. R. NASH
Stone & Webster, Inc., Boston, Mass.

IT IS not without significance that the committee on valuation now goes further than it did in 1919 in stating that it was strongly influenced in its recommendations by the fact that the courts have up to this time consistently held that present cost of reproduction must be considered. Obviously when seeking the protection of the courts, the methods which they adopt must be followed whether or not they appear most appropriate under existing circumstances.

In spite of the unbroken line of court decisions so far on record on this subject, it does not necessarily follow that some change with respect to public utilities may not be made because of special regulatory practices affecting them but not other industries subject to competitive influences. The Southwestern Bell Telephone case, referred to in the committee's report, occasioned a sharp division among the justices, disclosed in a dissenting opinion which presented in an able and forceful manner the advantages of prudent investment as a rate base. Although this basis was rejected in that case and in more recent Supreme Court cases, the actual recognition given in leading cases to present cost of reproduction as compared with investment has not been wholly encouraging up to this time. In no decision of last resort has present cost of reproduction been the sole measure of value, and in many cases fair value has been so brought down by averaging unit prices over a period of years, or by deductions for depreciation, or both, that the final finding of value has been but slightly higher than actual investment.

Regulatory commissions are still more strongly inclined to adhere to investment as the basis of return in rate cases. It is possible that a sufficient number of further decisions of our leading courts reversing this practice of the commissions would lead to their general adoption of the reproduction method as controlling. This process, however, would require a considerable period of years, during which, it is to be expected, there will be some decline from the present level of prices to a level much below the maximum prevailing in the post-war period, during which a large amount of public utility construction was necessary. If a few years hence construction prices have fallen to a level 50 per cent above the pre-war level, they will still be at least 33⅓ per cent below the peak prices prevailing in 1920. It is, therefore, conceivable that actual investment may not only approach consistency with reproduction cost, as pointed out in the report, but that it may materially exceed it after a period of years. A strict adherence to cost of reproduction might, therefore, in time work to the disadvantage of at least some utilities and holders of their securities.

It will be of interest to make certain assumptions as to the future level of prices affecting public utility properties and the growth of these properties to determine when, if at all, the cost-of-reproduction method will cease to yield a value higher than the actual investment. For this purpose a public utility has been assumed having, in 1913, 10,000 units of property, each with a value of $100 and, therefore, representing a total value (assumed to coincide with investment) of $1,000,000. Each year there is added to the property a number of similar units equal to 5 per cent of those then existing. Such an assumption is not inconsistent with the history of progressive public utilities. Next there has been determined the annual weighted average prices of units such as those assumed, and estimates have been made as closely as possible of the future movements of these prices. The prices of materials entering into public utility properties are now substantially higher than the average of all commodities. While the reasons for the discrepancy will in part continue, it is to be expected that there will be a tendency toward greater consistency within the next few years, after which a decline in public utility and other prices will continue at about the same rate as the increase which occurred during the period from 1896 to 1913 and the decrease during the preceding period which began about 1878. The rate of change in these periods was about 2 per cent per annum. It may appear inconsistent with the discussion and conclusions of the committee's report to assume a reduction in public utility construction costs continuing after they have come into accord with general prices, but such reduction is, nevertheless, anticipated by many well-informed people, and it is at least permissible to determine the results of such possible reduction.

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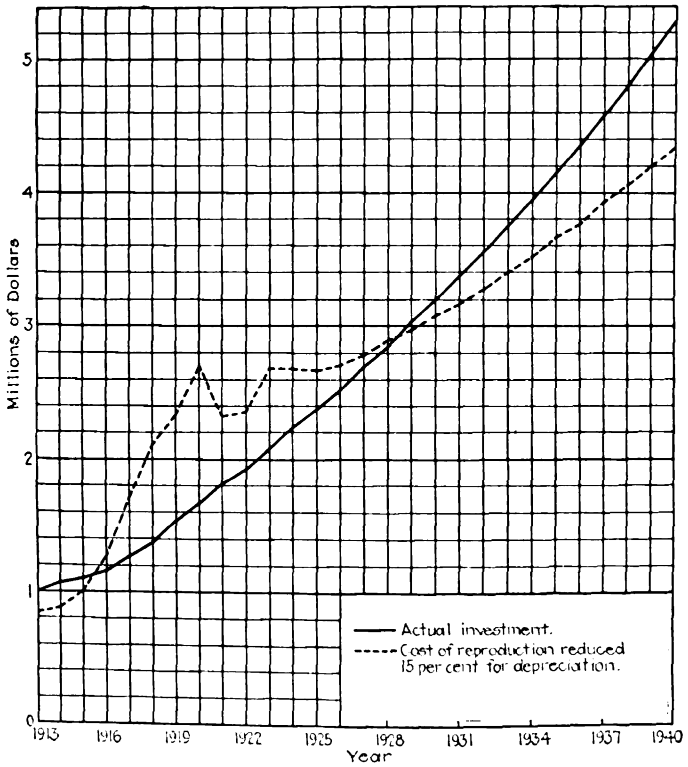
*Abstract of written discussion on the report of the A.E.R.A. valuation committee.

The above assumptions are all embodied in an accompanying table which shows for a series of years from 1913 to 1940 the number of units in the property, the current costs of these units, and the actual investment, starting at $1,000,000 and increasing from year to year by the current costs of the added units. There has then been computed the cost of reproduction of the entire existing units in each year at the prices then prevailing. The figures shown are not exact, being obtained by slide-rule computations.

The columns of total investment and cost of reproduction show a steady increase in the former but a far less regular change in the latter. The cost of reproduction increases rapidly up to 1920, after which there is an actual decline in spite of the annual increase in number of property units, which decline is not overcome for several years. It appears that in 1938 the investment begins to exceed the cost of reproduction, the excess increasing from year to year. It follows under the assumptions made that if public utilities, either voluntarily or through unreversed regulatory action, are limited to return on the investment for the next fifteen years, it would thereafter be to their advantage to have this basis of value continue instead of changing to cost of reproduction.



Relative Trends of Investment and Cost of Reproduction, Public Utility Valuation

If other assumptions were made as to rate of growth or the trend of future prices, different comparative results would be obtained. It goes without saying that a property without any growth since 1913 would continue to gain advantage through the cost-of-reproduction method as long as current prices remained higher than those prevailing in 1913. On the other hand, if the rate of growth were more rapid than that assumed in the accompanying table, the investment would overtake the cost of reproduction at an earlier date. If, for example, the property units increased at the rate of 10 per cent per annum instead of 5 per cent, the investment would exceed the cost of reproduction within ten years.

If the prices of public utility materials fail to decline materially during the coming years, the investment would not equal cost of reproduction until a later date, if at all, depending upon the trend of prices. If, on the other hand, the decline is sharper than that assumed, the investment would overtake the cost of reproduction more promptly. Computations in which prices are assumed to have fallen to 150 in 1930 instead of 1933, as in the accompanying table, show investment overtaking cost of reproduction within ten years from now instead of fifteen years.

The uniformity in rate of growth, assumed in the accompanying table, does not represent the facts, particularly during the period of most rapid price fluctuations. Prior to and during our participation in the World War there was an enforced curtailment of construction except where required for war purposes. During the following years of continued business activity and also of maximum commodity prices, it was necessary for many public utilities to undertake an exceptionally large amount of construction, and so the effect of peak prices upon investment becomes more pronounced than under the assumptions of a uniform growth. It follows that under such circumstances investment will overtake reproduction cost at an earlier date.

It is to be noted also that no deductions have been made for accrued depreciation from any of the figures compared in the accompanying table. A study of rate decision shows very few cases where deductions have been made from investment for depreciation, but a comparatively large number in which such deductions are made when the reproduction method is used in determining value. If, therefore, it is assumed that cost of reproduction figures are generally subject to such deductions and actual costs are not, there is a further tendency for investment to show an earlier advantage. Actual investment overtakes the cost of reproduction, shown in the accompanying

PUBLIC UTILITY VALUATION—RELATION OF COST OF REPRODUCTION TO INVESTMENT

(5 per Cent Increase in Property Units per Annum)

	Number of Units			Investment		
Year	Total	Annual Additions	Current Unit Costs	Total	Annual Additions	Cost of Reproduction
1913	10,000	.....	$100	$1,000,000	....	$1,000,000
1914	10,500	500	98	1,049,000	$49,000	1,029,000
1915	11,025	525	107	1,105,000	56,000	1,180,000
1916	11,575	550	130	1,177,000	72,000	1,505,000
1917	12,155	580	165	1,273,000	96,000	2,006,000
1918	12,760	605	195	1,391,000	118,000	2,488,000
1919	13,400	640	205	1,522,000	131,000	2,748,000
1920	14,070	670	225	1,673,000	151,000	3,166,000
1921	14,755	705	185	1,804,000	131,000	2,734,000
1922	15,515	740	180	1,937,000	133,000	2,794,000
1923	16,290	775	195	2,088,000	151,000	3,178,000
1924	17,105	815	185	2,239,000	151,000	3,165,000
1925	17,960	855	175	2,389,000	150,000	3,144,000
1926	18,855	895	170	2,541,000	152,000	3,206,000
1927	19,800	945	$166	$2,698,000	$157,000	$3,280,700
1928	20,890	990	163	2,859,000	161,000	3,405,000
1929	21,935	1,045	160	3,026,000	167,000	3,510,000
1930	23,030	1,095	157	3,198,000	172,000	3,616,000
1931	24,180	1,150	154	3,375,000	177,000	3,723,000
1932	25,390	1,210	152	3,559,000	184,000	3,859,000
1933	26,660	1,270	150	3,750,000	191,000	3,999,000
1934	27,995	1,335	148	3,948,000	198,000	4,143,000
1935	29,395	1,400	146	4,152,000	204,000	4,291,000
1936	30,865	1,470	144	4,364,000	212,000	4,444,000
1937	32,410	1,545	142	4,583,000	219,000	4,600,000
1938	34,030	1,620	140	4,810,000	227,000	4,764,000
1939	35,730	1,700	138	5,045,000	235,000	4,940,000
1940	37,520	1,790	136	5,28[illegible]	[illegible]	5,103,000

table and chart, in 1929 if the cost is reduced by 15 per cent for depreciation.

It would not be unreasonable, in the light of the above data, to predict that with only partial recognition of present cost of reproduction, which still prevails, and the deductions for depreciation which may be made because of such recognition, this basis of value will yield higher results than actual investment during only a few more years, after which its exclusive use would not be advantageous even if permissible.

This discussion, with its accompanying data, is not presented for the purpose of discouraging reasonable attention to cost of reproduction but to point out that investment should not be ignored. The report recommends that both these evidences of value should always be presented in rate cases as has been the general practice in the past.

Before the war the simplicity of the investment basis, which did not differ radically from cost of reproduction, had its appeal to both utilities and commissions. During and following the war departure from this basis was necessary to maintain the credit or solvency of many companies. A rate of return within the limits which the commissions felt free to authorize would not, when applied to investment, yield a return attractive to new capital. Other companies, however, passed through the war period with satisfactory rate adjustments without claims for value higher than investment.

With return to more stable economic conditions this basis should show increasingly favorable results, but, as the valuation report points out, cost of reproduction cannot safely be ignored whether it be greater or less than investment.

Publicity Committee Activities

BROAD plans for closer co-operation between the American Electric Railway Association and the state committees on public utility information have just been announced by Secretary James W. Welsh.

The outstanding feature of the new plans is to have a member of the committee on state and sectional co-operation in each state where there is a state committee on public utility information who will see that electric railways co-operate not only with the state and sectional association, but also with the state committees on public utility information. James P. Barnes, as chairman of the committee, already is bringing about closer co-operation, and the committee has arranged to have several speakers at state and sectional meetings in the near future. It is planned to have a speaker representing the American Association at each of these meetings throughout the coming year.

Representatives on the committee were chosen after conferences between W. H. Sawyer, chairman of the committee on publicity, and the directors of state committees. Other recent activities of the committee on publicity include:

A special interurban drawing designed to decrease crossing accidents has been reproduced on posters for hanging in car windows, waiting stations and elsewhere, and also on a postcard. Both posters and postcards are now being offered to the industry.

A special sticker for manufacturers' letters declaring that the manufacturer is dependent largely on electric railway sales for his business, and that the recipient as a customer of his should do all he can to help the electric railways, has been prepared and distributed. These stickers have proved very popular and orders for 50,000 already have been received.

The award of the special committee on inspection of exhibits at the Atlantic City convention, which was to determine what manufacturers were entitled to certificates of participation in the good-will work of the manufacturers, has been made. Certificates have been awarded to 115 companies, and the advertising section now is having the certificates signed and will place them in the manufacturers' hands in a few days.

The November issue of *Truth* has just been issued to the extent of 3,000 copies. Subjects with which it deals include Secretary Welsh's remarks regarding the increase in car riding; a story showing how it costs New York City taxpayers more than 10 cents to carry 5-cent passengers on the Staten Island trackless trolley; co-ordination of buses with electric railways; the decision of the Manchester (England) board of trustees that buses cannot perform the major traffic service; a human interest story regarding the introduction of new double-entrance cars in Brooklyn; the need for better vehicle laws; and the fact that workmen pay an average of $4 apiece in special taxes through railway fares which the companies do not get.

Important subjects on which the committee on publicity plans to produce advertising material include general interurban and tax problems and Xmas shopping between 10 and 4 o'clock. Work on material for the last-named problem is now under way.

New Members

THE following applications for membership in the American Electric Railway Association were approved by the executive committee at its recent meeting:

The Decatur, Champaign, and Bloomington & Normal divisions of the Illinois Power & Light Corporation.

Continental Secret Service, Philadelphia, Pa.

Keystone Lubricating Company, Philadelphia, manufacturer of lubricants.

For associate membership: Parsons, Klapp, Brinckerhoff & Douglas, New York, N. Y.

Newman Saunders & Company, Inc., New York, N. Y.

Ten applications for individual membership in the various associations were also approved.

A.E.S.C. Special Trackwork Committee Meets

THE second meeting of the sectional committee on specifications for special trackwork materials and design of 7-in. plain girder rail of the American Engineering Standards Committee was held Nov. 7 at the headquarters of the American Electric Railway Association, New York. After considerable discussion the report of the sub-committee on scope was adopted in the following form:

1. *Title of Specifications*—Specifications for special trackwork materials.
2. *Definition of Special Trackwork*—All rails, rail structures and fittings, other than plain unguarded track neither curved nor fabricated before laying.
3. *Principal Structural Items in Special Trackwork*—Switches; mates; frogs; crossings; guarded, curved and fabricated rails, etc. Appurtenances and fittings for the preceding items, such as plates, rods, fillers, braces, knees, guards, risers, stops, springs, housings, clips, bolts, nuts, washers, rivets, etc.
4. *Principal Materials in Special Trackwork*—(a) Rolled rails: tee, plain girder, girder grooved, girder guard. These rails may be of bessemer carbon steel, open-hearth carbon steel or manganese steel. (b) Rolled shapes: steel, iron. (c) Forgings: steel, iron. (d) Castings: gray iron, malleable iron, carbon steel, manganese steel.
5. *Specifications*—Existing specifications of A.R.A., A.R.E.A., A.E.R.E.A., A.S.T.M., M.T.S., etc., to be used as far as applicable.
6. *Steam Railroad and Electric Railway Special Trackwork*—Specifications to include all special trackwork for whatever use and of whatever type or gage, including steam railroad use in all services, including use in paved streets, electric railway service, storage battery, gasoline engine or any other motive power; industrial and mine tracks.
7. *Authority of Committee*—It is recommended that the tentative report of the sectional committee be submitted for information and suggestions to the track committee of the A.R.E.A. and the committee on way matters of the A.E.R.E.A. before final action is taken.
8. *Designs for Plain Girder Rails*—It should be understood that the designs are not necessarily to be confined closely to the weights of 90 lb. and 91 lb. for such rails as given in the assignment of the subject.

Those present at the meeting were: V. Angerer, chairman; R. C. Cram, vice-chairman; C. A. Alden, E. B. Entwisle, G. L. Fowler, H. H. George, E. P. Roundey, E. M. T. Ryder, J. B. Strong and G. C. Hecker.

Maintenance of Equipment

Close Fitting Trolley Ears Reduce Line Maintenance Cost

By G. H. McKelway
Engineer of Distribution Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y.

Within the last few years manufacturers of overhead line material have brought out round top hangers designed so that the ear can be screwed up snugly against the under side of the hanger. This construction is a great improvement. With the old design there was no certainty that the ear would be brought up close to the hanger, and after installation, the ear usually would have to be backed off a part of a turn to make it line up with the trolley wire.

The advantage of a tight fit and the damage that occurs to both the hanger and the ear by their slight relative movements if they are not securely fastened to each other can be seen by an inspection of the scrapheap. On one property I found from 50 to 75 per cent of the hangers were scrapped because the threads on the studs were so badly worn by movement that it was unsafe to reinstall them after they had been taken down, or to screw a new ear to them after the old one had been pulled off.

Worn Threads Limit Service

Many hangers with shells and insulation in splendid condition are made useless by worn threads, and years of additional service could be obtained if the studs were in good shape. In nearly all cases the ears attached to the hangers must be thrown away too, because of worn threads and not because of lips worn away or other defects.

Before the tight-fitting feature was added to round top hangers, good results were obtained by using either the cap and cone or "West End" hangers. With both of these types, however, there was liability of the stud unscrewing from the ear and letting the wire sag down. The turning of the stud can be prevented by the use of a lock washer, but this adds another part to the hangers, which are already composed of three parts, too many for quick and easy installation.

One engineer, seeing the advantage of keeping the ear close to the round top hanger, proposed making the hub of the ear thinner than was customary and dishing it out at the top. The outside rim of the hub would then bend down enough under pressure to permit twisting the ear another half turn. It would be necessary, however, to line up the ear if it should be out of line with the hanger. This plan was put into practice only to a limited extent and not enough to give it a conclusive trial.

The higher cost of the new design of hanger may seem to be a formidable objection, but careful consideration will show that there is a saving rather than a loss by the use of the newer type. If the old hanger costs 75 cents, and the new one 85 cents, and as not more than fifty-seven of these hangers are needed per mile, the increased cost will be only about $5.50 or $6 per mile.

The increase of life to be expected from the newer hangers over the ordinary type is at least 50 per cent and in some cases perhaps 100 per cent, so that the increased cost of 13½ per cent is more than offset by the saving. The ears when worn out will weigh 17 or 18 ounces and their scrap value is about 14 cents, at the present price of scrap copper. There will also be some saving in the number of ears, owing to the fact that a new car has to be installed practically every time a hanger is replaced. The percentage of such ears to the total number used will be very small, probably not more than 5 or 10 per cent, so that the saving on ears will reduce the difference in cost of the hangers by only about 3 cents.

The installation cost is still to be considered. If all of the hangers on a line are replaced at one time, this would be comparatively low, but the replacement of defective hangers is not done that way and often the line crew has to make a run of several miles, taking an hour or two of their time in order to replace a single hanger. Even under much better conditions it will be easy to calculate that the labor and trucking cost, whether the latter includes the use of horses, auto trucks or cars, will reach 50 cents for each hanger installed, and if that low amount be added to the other costs it will be found that the new type of hanger will cost only about 5 per cent more than the old type.

How Car-Type Resistors Can Be Standardized

Among the items of car equipment in which standardization will effect material reductions in the number of spare parts required for maintenance, grid resistors offer attractive posibilities. Railway systems using many types of equipment experience trouble and expense in maintaining resistors due to diversity in sizes and types. Under these conditions, according to the Westinghouse Electric & Manufacturing Company, a program of resistor standardization is practicable and will result in desirable saving in maintenance costs.

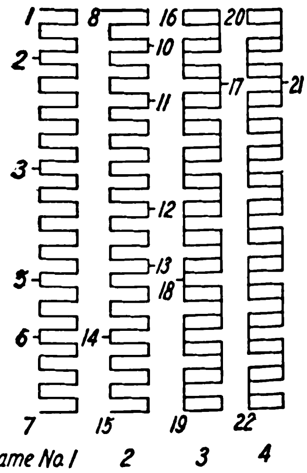


Fig. 1 — Standard Frames of 8-In., Three-Point Grid Resistors. Note That All These Frames Are of the Same Length (Thirty Grids) and Use Only Two Sizes of Grids

The ideal resistor equipment would be one in which grids of only one size are mounted in one frame, varying the number of these complete units on a car to suit the different motor and control equip-

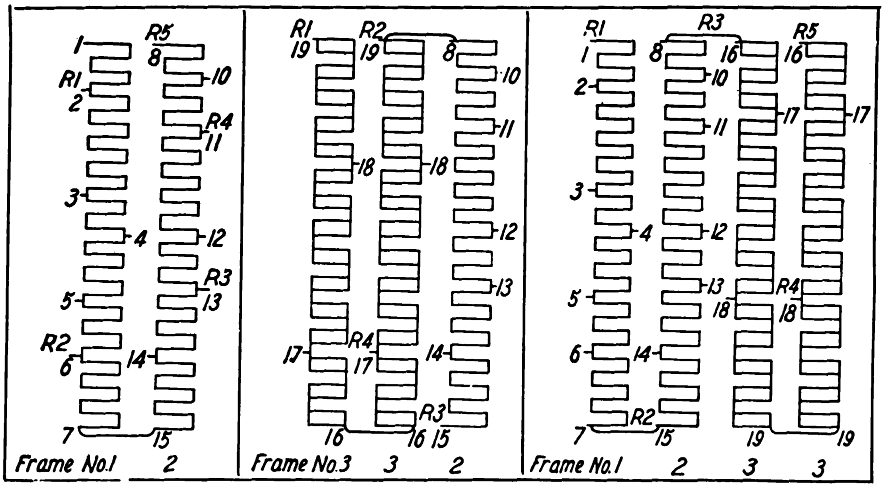


Fig. 2—Class "D" Standard Resistor. Made Up of One No. 1 Frame and One No. 2 Frame. Fig. 3—Class "J" Standard Resistor. Made Up of One No. 2 Frame and Two No. 3 Frames. Fig. 4—Class "C" Standard Resistor. Made Up of One No. 1 Frame, One No. 2 Frame and Two No. 3 Frames

ments. With many types of motor and control equipments on various types of cars, it is usually impossible to carry the standardization thus far, due to the capacity requirements and the various numbers of controller steps sometimes used on one property. The standardization usually can be carried to a point where not more than two different sizes of grids are employed. When more than one size of grid is required to provide for different equipments the individual frames should be designed, if possible, so as to use only one size of grid, i.e., with one current capacity and resistance value.

ONE SIZE UNITS DESIRABLE

A desirable arrangement provides a group of standard resistor units all of the same frame length, so that from this group certain frames could be connected in an assembly to give the required acceleration and current carrying capacity to any particular car equipment. It is possible to get an assembly suitable for each type ot motor and control equipment by using other combinations of frames from this group of standard resistors.

Fig. 1 shows four typical standardized frames in which, however, only two styles of grid are used. Frames 1 and 3 use style A grids connected respectively in series and in parallel, and frames 2 and 4 use style B grids, similarly in the series and the parallel arrangements. From these four frames combinations such as those shown in Figs. 2, 3 and 4 can be assembled for various motor equipments.

In applying this plan a number can be assigned to each standard resistor frame. Then in case of failure of grids it is only necessary to remove the defective frame and replace it by another of the same number, making the proper connections of resistor leads as shown on the car wiring diagrams. The car is then again ready for service. The damaged frame can be repaired later in the shop.

As a result of the decrease in types and sizes of grids that must be carried, this practice saves considerable investment in stock. In addition repairs can be made more quickly. The cars are therefore not kept out of service awaiting the assembly of special resistor frames. Still another advantage is that standardized resistor grids are readily obtainable from the manufacturer and will enable him to make shorter deliveries.

Beginning with the purchase of a certain lot of cars, the resistor frames for these and later purchases can usually be standardized. To extend this to older cars will, in some cases, require relocating other apparatus. The question to be determined, therefore, is that of selecting the standard frame length that can be applied to all cars, old and new, with the least expense in changing other apparatus under the car. Then the problem is to reduce the number of different grid resistors required to make up the frame to not more than three, and, if possible, two.

The standard resistor frame would provide for one standard tie rod with insulation, one type of terminals, etc., that are a part of the resistor. Further economies can be obtained by standardizing the insulated bolts, the hangers on the car and the method of mounting the resistors.

To carry out such a program, a thorough study of service conditions and requirements for different equipments on a given property must be made. In addition, the various weights of cars, types of motors, types of control, diameters of wheels, gear ratios, etc., must be considered.

Getting Best Results from Lightning Arresters

By R. T. Wagner
General Electric Company,
Schenectady, N. Y.

DISSATISFACTION with the protection afforded by lightning arresters is usually not the fault of the arresters. Improper installation and lack of maintenance nullify the protective value of any type. When dissatisfaction exists it is advisable to call in an expert so that the maximum benefit can be obtained from the investment that has been made in car arresters.

Users of arresters can, however, do much for themselves by thoroughly investigating the installations along the following lines:

1. Make a careful inspection of all the car arrester equipments and put them in proper mechanical adjustment. Check the coils, gap setting (25 mil gap standard) and resistance rods on the MD and MD-2 types. Inspect the carborundum block of the MP arrester and see that the circuit is continuous down to the arrester and from there to ground. Many of the old arresters are possibly in such condition that they should be removed and replaced with modern arresters, saving any parts in suitable condition for spares.

ROOF MOUNTING BEST

2. If possible to do so, a better installation can be effected by mounting the arresters on the car roof. Here they are away from the wheel wash and road conditions to which they are subject when located under the cars. The roof mounting also makes them more accessible for inspection and thus keeps them in better operating condition. With the under-car location, the only convenient time for inspection is when the car is run in over the pits. Furthermore, when installed on the roof on steel frame cars, a ground can be made right at the arrester, supplemented by the usual ground lead to the motor frame or axle housing.

3. With the gap-type arrester, in particular, some improvement can be effected by using a small choke coil

in the leads to the controllers. This can readily be made up of ten or twelve turns of the line conductor on a wood core of about 6 in. diameter.

4. It is advisable to keep some record of actual failures on car equipments due to lightning, particularly to show the locations on the system where trouble occurs, as well as the nature of the failure and the effect on service. This would give a basis for a more logical analysis of conditions in the future.

5. The d.c. aluminum arrester is the only real solution of the lightning protection problem where severe conditions are met. This type, however, requires a definite amount of attention and has a higher maintenance charge than the gap type. Experience on a large number of 600-volt systems in the worst lightning zones in the country has clearly demonstrated that this extra maintenance and higher cost is more than warranted by the freedom from lightning troubles which this type of arrester insures.

CAREFUL MAINTENANCE ESSENTIAL

On some street railway systems, however, a large proportion of the system is so shielded that severe conditions do not exist and the gap type should give a favorable degree of protection. Further analysis may show that certain lines or sections may require a better degree of protection. The first step would logically consist in giving the present arresters the best possible opportunity of performing their function. Obviously, there is no real advantage in investing in lightning arresters unless the arresters are properly installed and maintained.

The gap type of arrester as represented by the MD-3 arrester, which is the modern type of the MD and MD-2 arresters, is an arrester of limited discharge capacity and subject to the further limitations of any series gap arrester. This gap requires a certain definite voltage to break it down, and up to that point no protection exists. Where really severe lightning troubles exist, the direct current aluminum arrester offers the most nearly perfect protection that can be obtained on street railway work.

It is obvious that with the degree of shielding that exists on some systems there cannot be the amount of trouble from lightning that would occur on a similar amount of trackage and overhead lines in exposed open country. It is only on exposed sections outside the city that any very serious trouble might be expected. If conditions were such that cars were always operated on given lines, such exposed sections could be given a better class of protection than for the other lines. This has been followed with success in several instances. With the pooling of all equipment and its use anywhere over the system such a scheme is not feasible.

Supplying Sand to Locomotives

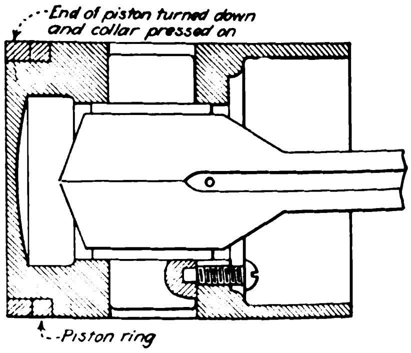
A CONVENIENT arrangement of elevated boxes for supplying sand to electric locomotives is used by the Norfolk & Western Railway at Bluefield, W. Va. Six sand boxes mounted on poles are arranged in two sets of three boxes each. These are placed so that the six locomotive sand boxes of a unit can be filled through the cab windows at one time by gravity, using the spouts which hang below the elevated boxes. An accompanying illustration shows the sand boxes and equipment. The sand boxes are filled from a drying room located on the near side of the track not shown in the illustration. The sand is conveyed from the drying room to the boxes by approximately 70 lb. of air pressure through 2-in. iron pipes, marked *B* in the picture. There are three of these riser pipes at the end of the first sand box of each group, one for each box. The distance from the drying room to the sand boxes is approximately 150 ft.

To fill the sand boxes on the locomotive the unit is run alongside and the spouts are placed in position through the cab windows. Valve handles marked *C* in the illustration open the discharge pipes. The boxes are 2 ft. x 4 ft. x 6 ft. in size.

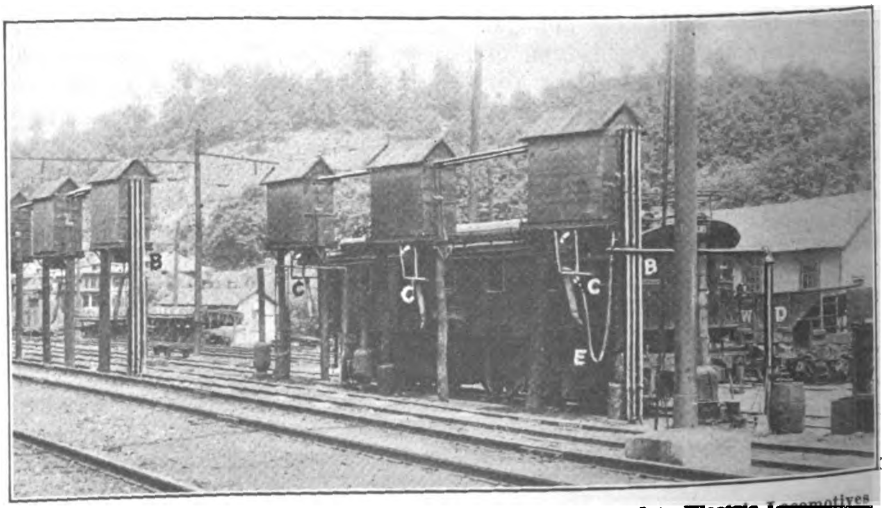
While receiving sand, the water rheostat used on the locomotive can also be filled. At the point marked *D* on the accompanying illustration there is a large pipe riser with a small horizontal cross pipe. A hose, marked *E*, hangs from this and is used to fill the rheostat.

Repairing Worn Piston Ring Grooves

WHEN the piston ring grooves in compressor pistons become worn to such an extent that a properly fitted piston ring cannot be installed, the New York Railways turns down the end of the piston and presses on a new collar to replace the metal removed. The accompanying illustration shows the method as used in the Fiftieth Street shop. By this method, the collar to be pressed on can be made of such a size as to give an accurate fit of the piston ring and make the cylinder practically as good as new in this respect.



Proper Fit of Piston Ring Is Made by Turning Down End of Piston and Pressing on a Collar to Replace Metal Removed



Special Arrangement of Elevated Boxes for Supplying Sand to Electric Locomotives of the Norfolk & Western Railway

The News of the Industry

Battle Promised in New York Legislature

Different Interpretations Placed on the Recently Enacted Home Rule Measure

At the November election the people of the State of New York voted in favor of an amendment to the State Constitution known as the "Home Rule for Cities" measure.

Recently, John H. Delaney, former transit commissioner of New York City, is quoted as having remarked:

> We will contend that cities are given the right to regulate public utilities within their boundaries. We will press the Walker-Donohue bills at the 1924 session and claim that by the mandate in the amendment itself the Legislature is required to pass them. The only difference will be that they must be statewide rather than applying only to New York City.

Other authorities are broadcasting the statement that the acceptance of the Home Rule amendment by the people gives each and every municipality the immediate right to regulate utilities located within its boundaries.

Section 7 of the amendment itself, the opening sentence, states:

> The provisions of this article shall not affect any existing provisions of law, but all existing charters and other laws shall continue in force until repealed, amended, modified or superseded in accordance with the provisions of this article.

It appears entirely clear to others, however, that unless and until the Legislature itself, in accordance with the constitution and law, modifies or amends present public utility statutes, such laws will remain in full force and effect, and unless and until the Legislature makes special provision for the application thereof, the new powers conferred upon cities will not be effective. That the Legislature of 1923 has something of this sort in mind appears to be evinced by the fact that it authorized a commission to prepare appropriate legislation to put the Home Rule amendment into effect provided it was approved by the people.

The exact status of the situation is this: The ratification of the Home Rule amendment by the people restricts the Legislature from the passage of any law affecting just one city of the state except the Governor recommends such legislation be enacted, and 100 members of the Assembly and thirty-four members of the Senate vote for its passage. There can be no more passage of local bills relating to one particular city on a mere majority vote of the Legislature; there must be a two-thirds vote and the Governor must first recommend its passage.

This means, in short, if the city of Buffalo wants authority to operate bus lines, if the city of Syracuse would regulate gas and electric companies, if the city of New York would have complete supervision, untrammeled by state control, over the transit situation, the Governor must first recommend such legislation and then two-thirds of the Legislature must concur in its passage.

By the adopton of the amendment the Legislature has been deprived of the right to enact local legislation affecting one city or particular cities having certain population by a mere majority vote and in order to allow Buffalo to operate bus lines must authorize all cities to exercise the same function, but the cities themselves have apparently not gained anything in the way of regulation of utilities within their boundaries unless existing laws are amended and special legislation is enacted to enable them so to do.

Routing with Steam Property Delays Cincinnati Project

The reason has been revealed why the Cincinnati City Council has not acted finally on the ordinance granting the Cincinnati, Lawrenceburg & Aurora Electric Street Railroad a franchise for an elevated structure from Anderson's Ferry to the heart of Cincinnati. Following the announcement of the intention of the city authorities to proceed with the Eighth Street viaduct reconstruction, notwithstanding the defeat of the bond issue for that project at the municipal election on Nov. 6, it was stated that the company's franchise ordinance would have to be revised to fit in with or accommodate itself to the general steam railroad terminal plans now being worked out by the managers' committee.

Stanley Shaffer, attorney for the Cincinnati, Lawrenceburg & Aurora, said it was true that delay regarding the ordinance was due solely to the fact that the routing of the line to coordinate with the steam railroad terminal scheme had not been determined, or at least disclosed. Mr. Shaffer, however, pointed out that a rerouting of the interurban line would be necessary only from near State Avenue eastwardly and that the plans already made would stand for that portion from Anderson's Ferry to State Avenue. He said he and his company wanted to "go along with" the general terminal plan, but they do not know what that plan is to be and when it will be possible for his company to proceed with construction. The plans of the interurban company call for the construction of an extension from Anderson's Ferry to Third and Walnut Streets. The elevated structure, a part of the general plan, would be built from State Avenue to Third Street over Mill Creek.

Transportation Systems Again Urged to Co-operate

Mr. Gadsden Urges Tax Reforms — Capital Can Be Obtained Only with Compensatory Rates

National transportation problems will be solved when steam, electric and gasoline systems are co-ordinated and when rates are established which will attract the investor in securities. This was the principal point emphasized in an address of Philip H. Gadsden, vice-president of the United Gas Improvement Company, Philadelphia, and former president of the American Electric Railway Association, before the Cincinnati Commercial Club, Nov. 17. Mr. Gadsden also is a member of a special committee of the United States Chamber of Commerce that recently has completed an extensive study of the national transportation situation.

No attempt should be made to elevate the taxes of motor cars to the present levels of electric railways, Mr. Gadsden said, because railway taxes are unfair.

On this subject of taxation he said that the broad policy to be adopted was not to load down the bus and the truck with taxes, as had been done in the case of steam and electric railways, but that action should be taken to review the whole subject of taxation of public utilities and instead of overburdening the bus and truck with taxation, the steam and electric railways should be relieved of all unjust and unnecessary taxation. He also said there should be worked out a principle of taxation for the public utilities on the basis of property value of franchises. He went on to say that when such equalization by way of regulation of taxation had been brought about the inevitable result would be that the field for the operation of the motor bus and truck would be as an adjunct and auxiliary of existing transportation systems.

Further that the proper solution of the whole problem could be found when it was approached from the standpoint of the economics of the transportation business. He said it was a matter of determining what was best for the country. Viewed from this angle, it meant that a system of transportation really was needed in which the steam railways, electric railways, bus and the truck had a proper and appropriate part to play.

He went on to urge the necessity of credit for effective railway operation. On this point he said that the companies ought to be allowed to charge such rates as will induce new capital to flow into the business.

The real test in the financing in the

last analysis was the investment market, but unless the rate is such as will induce new capital to flow into the industry, the rate was inadequate whatever authority may have fixed it.

He said that transportation was the foundation of our entire business structure and it ought to be the highest interest of all to see that these public servants were kept in strong and effective condition.

Joint Hearing on New York Central Application

A joint hearing will be held by the Transit Commission and the Public Service Commission on Nov. 26 on the application of the New York Central Railroad for the relocation of its tracks on the west side of Manhattan and for an order specifying the electrification of the company's lines south of Spuyten Duyvil.

The petition of the company seeks the relocation of its west side tracks under the general change of grade law which provides that one-half of the cost shall be borne by the company and one-half by the city and state. The company's petition to the Public Service Commission relates entirely to its obligation to electrify all its lines in the city under the provisions of an act passed by the last Legislature.

The hearing before the commission, which will be open to all individuals and organizations, is required by law and must be held upon not less than ten days notice to the company.

Public Service Speakers' Bureau

With the announcement by the Illinois Committee on Public Utility Information of the appointment of Keith Spade to head the Public Service Speakers' Bureau comes the information that this bureau will enter into a larger public speaking program. In the past year the work of this bureau has been to co-ordinate all the companies and their employees behind the speaker when he appeared in a community, to obtain proper newspaper and other publicity on speeches so that the message might go to others than the audience, and to assist managers in developing speaking talent within their own organization.

Mr. Spade comes to the bureau from the Monmouth Chamber of Commerce. He will further the activities of this department so that during the coming year greater benefit will be derived from the efforts of the speakers than has been in the past. In order to start this "greater speaking effort," a conference of managers in territorial districts will be held at conveniently located cities to acquaint local and district managers with the details of the program and to perfect district organizations. Each district committee will be responsible for formation in each city or town of a local public service speakers' bureau or unit and each local unit will take care of local engagements of lesser importance.

Two-and-a-Half-Cent Increase to Michigan Employees

The board of arbitration chosen to settle the wage controversy between the employees of the Michigan Railway lines, Jackson, Mich., and its officials, recently granted a 2½-cent increase an hour, effective June 1, 1923. The award was signed by Richard Price, the company's arbitrator, and John H. Lourim, the third arbitrator. Samuel H. Rhoades, representing the employees, refused to sign the award.

The men demanded an increase of approximately 15 cents an hour on April 30 to take effect as of June 1. At that time they proposed a wage scale of 60 cents an hour for motormen and conductors on two-man city cars, 65 cents an hour for operators of one-man city cars and 70 cents an hour for interurban motormen and conductors. The men had also asked for time and a half for overtime, fifteen minutes additional time for turning in day's receipts and thirty minutes additional time for making out accident reports.

The board said that in view of the company's financial condition the rates for conductors and motormen would be as follows: On city divisions the first year of service on two-man cars 44½ cents an hour; one-man cars 49½ cents; thereafter on two-man cars, 47½ cents, and on one-man cars 52½ cents.

On interurban divisions for the first six months' service 49½ cents and thereafter 54½ cents. In addition to the above there should be 5 cents an hour paid for all work in excess of regular schedule runs.

Samuel H. Rhoads, employees' arbitrator, who refused to sign the award, said that he did not think that the maximum rate of 54½ cents was a reasonable wage for the men, contending that with the present cost of living the wage was not sufficient for a position that was so exacting and which entailed great responsibility. Discussing the contention that the company was unable to pay more he said that the remedy should not be to make the employees work for an unreasonably low wage. He said that the public, which was given the benefit of the service, should pay what it costs to operate the railway system, including the payment of reasonable wages and a fair return to the owners.

Candidate Under Indictment Defeated in Buffalo—Socialist Re-elected

State Senator Robert C. Lacey of Buffalo, who is under indictment in connection with the dynamiting of the Buffalo-Niagara Falls high-speed line of the International Railway during the strike a year ago, when about two-score passengers were injured, was defeated for member of the City Council at the last municipal election. He polled a larger vote, however, than the two members of the Citizens' ticket fostered by the Chamber of Commerce and other business interests of the city. Frank C. Perkins, Socialist, and an advocate of municipal ownership, who has been bitter in his attacks on the International Railway, was re-elected by the largest vote ever received by a candidate for public office in the city. He polled almost three times the number of votes cast for the Citizens' ticket candidate for better government.

Official Must Serve Sixty Days for Criticising Court

The United States Supreme Court held, in effect, in a decision rendered on Nov. 19, that Charles L. Craig, Comptroller of the City of New York, must serve a sentence of sixty days in jail for contempt of the United States District Court. The case arose out of receivership proceedings for the New York Railways in 1919. Receivers were named by the District Court. The city of New York applied for appointment of a co-receiver to represent it for the Brooklyn Rapid Transit Company. This the court refused. Comptroller Craig wrote Public Service Commissioner Louis Nixon a letter criticizing the court. The letter was published. Some months later contempt proceedings were brought and Mr. Craig was adjudged in contempt. The case reached the Supreme Court on a question of the competency of the court to hold Mr. Craig and not on the main issue of contempt.

Trackwork Recommended in Madison in Connection with Paving

The city engineer of Madison, Wis., has recommended that the City Council should take the proper steps to adopt an ordinance requiring extensions and improvements to be made by the Madison Railways to its system simultaneously with the city's street improvement work so that rails will be placed when the city starts carrying out its paving program.

A big track extension problem faces the railway if the city carries out the improvement of streets in which there are car tracks, as it will require the company to lay a west track on Breese Terrace, double tracks on University Avenue, North Hamilton Street from Pinckney to Johnson, and Williamson from Baldwin to the Yahara River. Heavier rails will also be laid by the company on Jenifer Street from Williamson Street to Baldwin Street, a distance of six blocks, if a resolution introduced before the Council for that purpose goes through.

An ordinance passed by the Council last summer provided that the company would hereafter be relieved of all future charges for paving between its track zones.

Must Not Abandon Line.—The State Supreme Court at Topeka, Kan., recently decided in favor of the city of Salina in a case brought to compel the Salina Street Railway to continue operation of a part of its line which the company had thought to abandon.

Service Retained in Davenport

Agreement Between City Council and Tri-City Railway Allows for a Ten-Cent Cash Fare with Low Ticket Rate

Street car transportation has been retained in Davenport, temporarily at least, by the following major provisions of an agreement reached between the City Council and the Tri-City Railway of Iowa: A 10-cent cash fare, but fares as low as 6⅔ cents on a ticket plan, rerouting to eliminate approximately 4½ miles of trackage no longer needed, a faster service during the rush hours of the day, payment by the company of its assessed share of the 1923 paving program, valuation of traction lines on same basis as other business concerns for general taxation, single instead of double truck cars, trial period of four months for the new ticket plan, allowance of a 6 per cent return on the investment; city to favor enactment by the Iowa Legislature of provisions making it optional with cities to relieve electric railways of paving cost.

This settlement plan is not only accepted by the City Council and traction line but is also indorsed by a citizens' committee selected from non-political and representative civic organizations. The report, accepted by the committee of the whole of the Council on Nov. 20, will be ratified on Nov. 28 at the regular Council session.

It is in response to a clear statement by President B. J. Denman of the traction lines of the possibility of discontinuing railway service that the present plan came into existence. The surface lines have lost money for several years past and their straits finally became so acute that the city was told service would be abandoned unless a relief plan could be devised. Negotiations of several months have finally resulted in the acceptance of the present plan.

By the sale of fifteen tickets for $1, seven for 50 cents and three for 25 cents, it is hoped that riding can be popularized to such an extent that it will be encouraged and revenues increased. The company is hoping that this will be the case, but acceeded to the city's request along this line with considerable doubt as to the possibility of thereby increasing the revenues. The fare up to the present time has been a straight 8-cent fare.

Also by this arrangement the company agrees to pay $120,000 for paving which it believes should not be assessed against a traction line. Such an investment will never bring in a cent of revenue and is also accepted by the company without enthusiasm and largely because of the fact that the company considered itself obligated to this payment.

The valuation on which the company is to be allowed a return of 6 per cent is $3,250,721, another concession by the traction lines, as the latter proposed a valuation of $4,250,000. The new system of fares is to go in operation on Jan. 1, 1924, and the system is to continue for a period of four months after the entire plan is put into operation.

It is provided that, in case the revenues in succeeding months do not return 6 per cent on the investment, first the fifteen tickets for $1 rate and later the seven tickets for 50 cents rate be abandoned and the three tickets for 25 cents rate be retained as the basic fare.

News Notes

Franchise Granted.—The Lake Shore Electric Railway, Cleveland, was granted a twenty-five-year franchise by the Sandusky County Commissioners on Nov. 13. Besides rights to operate cars through the county, the company can use the new concrete bridge to be built across Sandusky River at State Street, Fremont. Work on the new bridge will start at once. In return, the company must pay to the county $12,500 cash within sixty days and make an annual payment of $1,000 during the life of the franchise, or as long as it uses the bridge jointly with the county. The company must also move part of its track from McPherson highway, west of Fremont, to eliminate danger to traffic.

Inter-Utility Meeting Held.—For the first time in the history of Wisconsin utility circles an inter-utility meeting took place recently in Janesville. Approximately 130 executives and employees attended. Recommendations were unanimously passed to assemble informally at frequent intervals, affording individuals an opportunity to interchange ideas with one another.

Getting at Bottom of Dynamite Outrage.—New developments in the government's investigation of the dynamiting of the Buffalo-Niagara Falls high-speed car in August, 1921, during the strike of platform employees which resulted in the injury of almost forty passengers, are expected to implicate several more of the company's striking employees, it was stated at the office of Colonel William J. Donovan, United States District Attorney. The renewal of the investigation was prompted by alleged confessions by men believed to be involved in the dynamiting outrage. The fourteen men now under indictment will be placed on trial early next month in United States court.

Transit Work Hastened.—Following Director Twining's recent appearance before the City Council of Philadelphia, announcing that he would proceed with preliminary work on transit construction if he were given the necessary funds, it was immediately proposed that the money be provided. The preliminary work in connection with the Broad Street subway of the Darby line will be financed by an appropriation of $50,000, which the City Council will give the Department of Transit through a transfer bill. Director Twining said that the money would be expended in making borings, particularly in the Schuylkill, where it will be necessary to erect piers for the Darby line. Some part of it will be used for borings in North Broad Street.

High-Speed Line When Costs Come Down.—The Ohio River Edison Company, Youngstown, Ohio, a subsidiary of the Pennsylvania-Ohio Electric, in turn controlled by the Republic Railway & Light Company, is securing a right-of-way from the Ohio River Valley to this district for an electrically operated freight line to be built when conditions permit. The right-of-way for the contemplated freight line parallels that of a high-tension electric power line that the Ohio River Edison Company will build next year from its steam-electric plant at Toronto on the Ohio River to Youngstown.

Resolution Calls for Car Approval.—A resolution has been introduced before the City Commission of Trenton, N. J., calling for the approval of all trolley cars by that body before they can be placed in operation. The ordinance does not prescribe a type of car to be used by the Trenton & Mercer County Traction Corporation, but does provide that the type be of a character to meet the approval of the commission. The ordinance is understood to have been introduced on account of dissatisfaction with the conditions surrounding the one-man cars now being used in Trenton. The commission is said to be anxious to have the railway use larger one-man cars. The ordinance gives the commissioner the power to reject all cars not approved by that body.

Opposes Company's Relief Petition.—Protest against a petition filed with the Seattle City Council by the Seattle & Rainier Valley Railway, asking relief from certain franchise agreements, was voiced recently at a mass meeting of residents of the Rainier Valley district. The petition presented asks among other things that the road be released from the payment of a 3 per cent tax on its gross earnings, and from paving 1,000 ft. of the street between its tracks. W. M. Brown, manager of the company, appeared before the meeting and outlined the company's position in asking the relief, and stated that unless it is granted, the company will have to restore fares to the 10-cent level next month. The present cash fare is 10 cents. Three tokens are sold for a quarter.

Paving Plan Halted.—Denver figured a paving program, known as "the $4,000,000 paving job," but on the eve of starting, the city engineer's office finds that the Denver Tramway, which is supposed to stand its proportion of the amount, cannot pay for more—in any one year—than "between and for alongside of its tracks, a 6-mile length." City officials, the tramway officials and others are trying to work out a plan that will permit the city to proceed with the program.

Foreign News

May Electrify Rumanian Railways

A recent report from Bucharest stated that the Rumanian government intends electrifying portions of the railways of the country. Some facts with respect to this property are noted in view of this report.

In September, 1923, the railway traffic on Rumanian territory amounted to more than 50,000 trains per month, or an average of 1,600 trains per day, as against only 287 trains per day in 1921. Of the total number 57 per cent are passenger trains and 43 per cent freight trains. The traffic is carried on by means of 2,000 locomotives, as compared with 1,540 in June, 1922, and 1,050 in June, 1921.

Most of the bridges have been reconstructed and rails and sleepers renewed. Large orders have been placed in Germany of late for all kinds of rolling stock and material. The railway lines in Bessarabia—formerly Russian territory—have undergone great improvements and the gage has been changed from the Russian to the standard Rumanian. However, the substructure of these lines leaves still much to be desired. The receipts of the Rumanian Railways rose from 64,000,000 lei in September, 1921, to 200,000,000 in 1922, and amounted in August, 1923, to 305,000,000 lei.

American manufacturers of electric railroad equipment would do well to pay close attention to the further developments of the Rumanian Railways. All the roads are owned and operated by the state (Caile Ferate Romane), with head offices at Bucharest.

Berlin's Record Under Private Company

The transfer of the Berlin Municipal Street Railways from direct municipal operation to operation by a private corporation seems to be working well, according to an article by Dr. Lademann in the Oct. 26 issue of *Verkehrstechnik*. It will be recalled, as the ELECTRIC RAILWAY JOURNAL for Sept. 15, page 423, pointed out, that the lines are still publicly owned.

The reorganization became effective on Sept. 10, 1923, and was accompanied by a large reduction in personnel and also a more practical interpretation of the municipality's eight-hour day rule for all employees. In the case of the street railways, this rule now means eight hours' platform time. The system has also been rerouted to great advantage and eighty-nine routes have been cut to thirty routes which are far more direct. The new lines are better balanced as regards traffic and there has been a reduction of car-miles by more turn-backs.

The lines now have a single fare without charge for transfer. This fare was 200,000,000 marks up to Nov. 1, but on that day it was to be increased tenfold. The same increase to the same fare was to be made on the subway and on the bus lines.

The earnings for the first five weeks of operation under the company plant, i.e., since Sept. 1, have proved encouraging. The deficit of 20,000 gold marks (100,000,000,000 paper marks) a day has been eliminated. The number of car-kilometers run has been reduced from the August average of 200,000 (124,000 car-miles) to 120,000 (74,400 car-miles) a day. The density of traffic has increased from 3.31 per car-km. (5.1 passengers per car-mile) to between 4 and 5 per car-km. (6.4 to 8 passengers per car-mile). It must be remembered in connection with the density figures that the average Berlin street car has less capacity than a Birney safety car.

Electric Cars Replace Mules in Maranhao

Mule-drawn cars operated by the State of Maranhao, Brazil, are to be replaced with modern electric cars. Maranhao, the sixth largest state with a population of more than 500,000, occupies a wide sweep of the north coast of Brazil.

Electrification Plans in Czechoslovakia

A comprehensive program of electrification of the steam railroads of Czechoslovakia is just beginning. The first line to be electrified will be the Prague-Kladno line, which is a single-track coal-carrying railroad 30 km. in length. After this will follow the Prague-Zdice-Plzen and Prague-Kolin-Pardubice lines, respectively 115 and 104 km. of double track.

Electrification work will be furthered by the construction of several electric central stations, the first of which, at Rvenice, in the north Bohemian lignite coal district of Chomutov, Most and Duchcov, is nearing completion and will have 40,000 kw. in service next year. A 100-kv. transmission line between Rvenice and Prague, over 84 km. long, is being erected. Following this a hydraulic plant will be built at Stechovice on the Vltava River, with a capacity of some 30,000 kw. Both these plants are being constructed by the Central Electric Plants Company, partly with public and partly with private funds.

The system of electric traction to be used has not yet been definitely decided. The neighboring lines of Germany and Austria employ single-phase current with 15 to 16⅔ cycles and 15 to 16 kv. on the trolley wire, but the high-tension direct-current system also has many adherents, as in France, Belgium, Holland and Great Britain.

The railroads are of light construction, with normal weights per axle of 14.5 metric tons and 1,435 mm. gage, thus giving only limited possibilities as to weight and dimensions of the traction machinery.

London Tube Facilities to Be Extended to Meet Competition

More than £13,000,000 will be expended on extensions of London's tube railways during 1924 and 1925. It has been demonstrated to the satisfaction of the London company's management that a short underground railway no longer can be operated profitably. For this reason plans have been perfected for joining existing lines and for the driving of new tubes, so as to make possible longer hauls. Provision will be made for the operation of more express trains and the maintenance of much higher speeds. This will require some substitution of rail and extensive roadbed betterments.

The announcement has been made that during this month construction will be started. These new works were authorized by an act of Parliament passed last summer, and the beginning of operations has been expedited in order to help in the coming winter the relief of unemployment. It is stated that this new work, along with other projects, will give employment to 25,000 or 30,000 men for nearly two years.

The principal extensions will be the driving of the London Electric Railway's Hampstead tube from Golders Green to Eggewear and the carrying of the tube of the City & South London Railway from Clapham Common to Morden. This latter extension also involves heavy reconstruction in increasing the bore of the existing tube from 10 x 7 ft. to 11 x 8 ft. A new cut-off will be put through which will give the South London line through service from two great traffic centers—Charing Cross and Waterloo Station.

The Piccadilly tube of the London Electric Railway is to be extended from Hammersmith so as to connect with the District Railway near the junction of its branches to Richmond and to Uxbridge. This will make possible the operation of through tube trains from those important suburbs. The Piccadilly line runs under the very heart of the business district, but its income comes largely from short-haul traffic.

These major improvements have been hastened by the loss of buses of short-haul business. Underground lines in 1923 have been running some 500,000 passengers weekly behind the 1922 figures. The decrease is due almost entirely to the use of buses for the shorter trips it is believed. Since some 60,000,000 passengers are carried weekly on the underground railways, the loss is less than 1 per cent as compared with 1922, but the management believes these losses will continue at an increasing rate and steps are being taken to meet them.

Financial and Corporate

Interurban Control Changed

Bondholders Now Operate Iowa Road—New Interests Hope to Make Line Profitable

Control of the Waterloo, Cedar Falls & Northern Railway, Waterloo, Iowa, has passed into the hands of the holders of the first mortgage bonds of the company through their protective committee. E. B. Kane, chairman of that committee, has explained that on Oct. 27 it secured control of 21,700 shares of the total outstanding of 23,330½ shares of the common stock. The stock has been transferred to him as trustee for the bondholders' protective committee for the purpose of enabling the committee to take over the company and all its property and assets and operate them without immediate recourse to the remedies provided in the deed of trust under which the first mortgage bonds are secured.

Immediately following the transfer of stock, the old management resigned and was succeeded by the following new directors representing the bondholders' protective committee: C. M. Cheney and J. B. Knowles, Waterloo, Iowa; George E. Hise, Des Moines, Iowa, and Charles J. Hetburn and Edward B. Kane, Philadelphia. The officers who resigned were L. S. Cass, president; J. F. Cass, vice-president; C. D. Cass, general manager, and W. H. Burk, secretary, treasurer and auditor. Officers were elected as follows to fill these vacancies: C. M. Cheney, president and general manager; C. D. Cass, vice-president, and J. B. Knowles, secretary, treasurer and auditor.

Mr. Kane explains that the immediate effect of the change of management was a reduction of expenses. It is believed that other economies are practicable without affecting the efficiency of the service. The developments just noted clear the way for constructive efforts. Radical changes, he says, must not be expected at once. Reasonable time should be allowed the new management for the application of new policies, the introduction of economies and the development of new business. Not until these influences have been fully tested, will the committee be able fairly to gage the earning possibilities of the property under the reorganization.

Mr. Kane says that the strategic position of the road with its valuable freight belt line and its connection with five steam trunk railroads suggest the practicability of a merger under the new railroad act. This, too, he says will require time for consideration and negotiation. He explains that the company is at present earning little more than its operating expenses, taxes and maintenance. Liberal allowance has, however, been made for upkeep so that the property is in fair physical condition. What with economies, increased traffic and reduced bus competition, the new management hopes to present in the coming year results which will reflect a favorable contrast with the past.

Up to the present time, 85 per cent of the outstanding bonds have been deposited with the protective committee. In view of the developments just noted, the committee has decided that the time for the deposit of additional bonds under the bondholders' protective agreement shall be extended to Dec. 31.

Deficit in Cincinnati in October

Compared with October, 1922, when a 7½-cent fare was in effect, the report of the Cincinnati Traction Company for October, 1923, shows that while the income of the company was slightly in excess of the corresponding period last year, there were fewer cash fares paid. In October, 1923, when the 8-cent fare was started the traction company carried 9,263,041 pay passengers and the revenue obtained was $730,643. During the same period in 1923 under the 7½-cent rate the number of car riders was 9,282,803 and the revenue produced was $705,295.

Other revenues received by the traction company during October, 1923, bring the total receipts to $737,391. The traction company paid for operating expenses during October $499,533, and the remainder was used to pay off other obligations due under the service-at-cost franchise, with the excepton of $29,989 due the city for that period as a franchise tax.

The traction company during October incurred a deficit of $73,350. In the event the company shows a deficit in its operating expenses for November it will be compelled to raise the rate of fare another half cent to 8½ cents on Jan. 1. Under the terms of the service-at-cost franchise the traction company is permitted to raise its rate of fare following deficits in its operating expenses for two consecutive months.

J. K. Newman Reported in Kansas City Reorganization

It is expected that J. K. Newman of Newman, Saunders & Company, New York and New Orleans, will head the movement to reorganize the Kansas City Railway. Mr. Newman is said to be at the head of a syndicate which has purchased through the Chase National Bank, New York, $5,000,000 of defaulted notes and bonds of the Kansas City Railways. The consideration is not known, but the company's first mortgage bonds have been quoted at 40 cents on the dollar, and second mortgage paper much lower.

Mr. Newman has been conferring with other security holders in the company in Chicago, Philadelphia and other northern cities.

Resolution Authorizes Bond Issue by Philadelphia Rapid Transit

A resolution was introduced in the City Council of Philadelphia recently by Mr. Weglein which authorized the Philadelphia Rapid Transit Company to float a $2,500,000 first-mortgage bond issue. The $2,500,000 bond issue, made possible under the transit agreement of 1907, will be secured by mortgages on the Luzerne Street and Callowhill Street carhouses, and upon the terminal to be built at Twentieth and Johnston Streets. At present there is an existing mortgage on the Luzerne and Callowhill Streets terminals for $1,300,000, of which $335,000 has been paid off. The proceeds of the $2,500,000 issue will be used to pay off the $965,000 outstanding and to complete the construction of the South Philadelphia terminal.

A second ordinance, which was also presented by Mr. Weglein, would permit the company to buy up $8,874,000 of a $10,000,000 bond issue floated in 1912. The bonds were sold with the understanding that they could be recalled at any time up to Dec. 31, 1923, and resold at a higher figure. According to a letter to Mr. Weglein from W. C. Dunbar, president of the Philadelphia Rapid Transit Company, the issue is recalled because the company wants to avoid a permanent sale of the bonds at the low figure.

Another Melon at Montreal

The *Canadian Financial Post* says that there is reason to believe that shareholders of the Montreal Tramways will shortly have the opportunity of subscribing for about $1,000,000 of stock of their corporation. The stock is now selling at $150 a share. The amount of capital stock outstanding is only $4,000,000, and a $1,000,000 issue would give each shareholder the opportunity of buying one share of stock at $100 for each four shares now held. This would make the "rights" of subscription worth about $12.50 for each share at present outstanding.

There was $2,000,000 of Montreal Tramways stock issued at the time of organization. In April, 1913, stockholders were offered $1,000,000 at par. and as the stock went to about 235 in the next year the privilege of buying the stock at par was valuable. In September, 1915, another $1,000,000 was allotted at par, although the stock was selling in the neighborhood of 220.

Negotiations for the sale by the Montreal Tramways of an important right-of-way owned by it in the city of Montreal to the Canadian National Railways has attracted attention. The right-of-way parallels the C. N. R. line, which requires additional land to bring its right-of-way up to the minimum requirements of the Board of Railway

Commissioners. The sale, which is understood to have been consummated, would add a comfortable sum to the company's cash position.

Washington-Virginia Securities in Default

The Washington-Virginia Railway, Washington, D. C., has defaulted in the payment of principal and interest of its 6 per cent bond secured gold notes, dated Jan. 1, 1920, maturing Jan. 1, 1922. In consequence it has been announced that the Bank of North America & Trust Company, Philadelphia, trustee, will sell on Nov. 28, at public auction, $3,000,000 first lien refunding mortgage gold bonds of the company, dated Jan. 1, 1919, due Jan. 1, 1969.

The company operates 63 miles of line from Washington, D. C., to Alexandria, Mount Vernon, Arlington, Fort Meyer, Rosslyn, Clarendon, Vienna and Fairfax.

Auction Sales in New York.—At the public auction rooms of A. H. Muller & Sons, there were sold this week 400 shares of Interborough Consolidated Corporation, common $6 lot, and 1,000 shares of Brooklyn Rapid Transit (old stock), $12 lot. There were sold last week 300 shares of American Cities, 6 per cent preferred stock, $16 a lot; seventy-five preferred parts of the Kansas City Railway Company beneficial certificates, $77 lot, and 1,618 shares of the Omaha & Council Bluffs Street Railways Company, common, $1,600 lot.

High-Speed Electric Line Pays Dividend.—The West Jersey & Seashore Railroad has been put on a semi-annual dividend basis by declaration of 2 per cent paid Oct. 15 to stock of record Oct. 1. Last March the company resumed dividends with a declaration of dividend of 2 per cent out of earnings for 1922. The Pennsylvania Railroad owns 54 per cent of the stock. At a meeting of a committee of stockholders of the West Jersey & Seashore Railroad appointed by the board to consider a lease of property to the Pennsylvania, David Baird resigned as chairman of the committee on account of press of other business and in his stead William J. Sewell was elected chairman. Mr. Baird remains a member of the committee.

Authorizes Interest Payments.—The receivers of the Pittsburgh Railways were recently authorized by Judge Gibson, in the United States District Court, to pay the Union Trust Company of Pittsburgh, trustee under the Southern Traction Company mortgage, $100,000, representing interest coupons due Oct. 1, 1923. The receivers were also authorized to pay the Guaranty Trust Company of New York $63,475 which was the installment due Oct. 1, on the outstanding bonds secured by the general mortgage of the Pittsburgh Railways.

Authorizes Bond Issue.—The Arkansas Railroad Commission has authorized the Fort Smith Light & Traction Company to issue $107,000 in bonds, the proceeds to be used for extensions and improvements.

Stage Lines Affect Railway's Earnings.—Invasion of the Portland-Willamette Valley district by stage lines has so depleted the earnings of the Oregon Electric Railway, serving this district, that the line was unable to meet its bond interest payments on Nov. 1. Whether the Spokane, Portland & Seattle Railway, which owns the line, will advance the necessary funds in the sixty days allowed before default is problematical, in the opinion of W. F. Turner, president of the Oregon Electric. The net loss from operation, taxes and bond interest during the present year so far amounts to $204,000, or approximately $40,000 greater than the corresponding period of last year. It is expected, Mr. Turner stated, that the deficits for the entire year of 1923 will exceed $300,000. In the event of foreclosure proceedings, a reorganization of the Oregon Electric Railway to bid in the property may be undertaken, it is said.

Preferred Stock for Sale.—Bonbright & Company, New York, are offering at 97½ and accrued dividends to yield about 6.15 per cent, $2,400,000 of the Electric Bond & Share Company 6 per cent cumulative preferred stock. The preferred stock will be followed by $22,400,000, par value, of common stock, all owned by the General Electric Company.

Bonds Offered.—The National City Company, New York, is offering $1,000,000 of the Tennessee Electric Power Company ten-year 6½ per cent debenture bonds. The bonds are dated Oct. 1, 1923, and are due Oct. 1, 1933. The proceeds from the sale of these bonds will be used to finance additional property expenditures and to increase the company's working capital. The issue has been authorized by the Railroad & Public Utilities Commission of the State of Tennessee.

Bonds Called.—In connection with the sale of the properties of the Tuscaloosa Railway & Utilities Company to the Alabama Power Company, arrangements have been made for the surrender of the cancellation of more than 90 per cent of the first mortgage, twenty-five year 6 per cent bonds dated July 1, 1940. For the purpose of redeeming and cancelling the bonds, the company has called in all of the bonds at 102 and interest on Jan. 1, 1924.

To Hear City's Appeal.—The Superior Court will hear during the week of Dec. 10 the appeal of the city of Philadelphia from the ruling in which the Public Service Commission fixed the valuation of the Philadelphia Rapid Transit property. This is the result of an order of that court signed by President Judge Orlady. The date had been set for Nov. 19, but under an agreement the hearing was deferred.

State Commission Fixes Buffalo Valuations.—The New York State Tax Commission has submitted to the municipal authorities of Buffalo the valuation figures it puts on the special franchises held by up-state public utility companies for use as the basis for calculating their taxes. The figures as relating to traction lines are as follows: Buffalo & Lackawanna Traction Company, $200,000; International Railway, $7,345,000; South Buffalo Railway, $22,800. The commission will hold a hearing in Buffalo on Nov. 27, at which the corporations will have an opportunity to protest if they feel the valuations are too high.

Conspectus of Indexes for Nov., 1923

Compiled for Publication in this Paper by

Albert S. Richey
Electric Railway Engineer
Worcester, Mass.

	Latest	Month Ago	Year Ago	Since War	
				High	Low
Street Railway Fares* 1913 = 4.84	Nov. 1923 **6.95**	Oct. 1923 **6.95**	Nov. 1922 **6.98**	May 1921 **7.24**	May 1923 **6.88**
Street Railway Materials* 1913 = 100	Oct. 1923 **161**	Sept. 1923 **163**	Oct. 1922 **177**	Sept. 1920 **247**	Sept. 1921 **156**
Street Railway Wages* 1913 = 100	Nov. 1923 **218**	Oct. 1923 **218**	Nov. 1922 **208**	Sept. 1920 **232**	Apr. 1923 **207**
Steel—Unfilled Orders (Million Tons) 1913 = 5.91	Oct. 31 1923 **4.67**	Sept. 30 1923 **5.04**	Oct. 31 1922 **6.90**	July 31 1920 **11.12**	Feb. 28 1922 **4.14**
U.S. Bank Clearings Outside N. Y. City (Billions)	Oct. 1923 **16.18**	Sept. 1923 **13.90**	Oct. 1922 **15.37**	Mar. 1920 **18.54**	Feb. 1922 **10.65**
Business Failures	Oct. 1923	Sept. 1923	Oct. 1922	Jan. 1922	Sept. 1923
Number	**1,584**	**1,280**	**1,602**	**2,722**	**1,280**
Liabilities (millions)	**74.43**	**27.50**	**39.94**	**105.7**	**27.50**

	Latest	Month Ago	Year Ago	Since War	
				High	Low
Eng. News-Record Construction costs 1913 = 100	Nov. 1923 **220.9**	Oct. 1923 **220.3**	Nov. 1922 **188.6**	June 1920 **273.8**	Mar. 1922 **162.0**
U.S. Bur. Lab. Stat. Wholesale Commodities 1913 = 100	Oct. 1923 **153**	Sept. 1923 **154**	Oct. 1922 **154**	May 1920 **247**	Jan. 1922 **138**
Bradstreet's Wholesale Commodities 1913=9.21	Nov. 1 1923 **13.14**	Oct. 1 1923 **13.10**	Nov. 1 1922 **13.35**	Feb. 1 1920 **20.87**	June 1 1921 **10.62**
Dun's—Wholesale Commodities 1913 = 120.9	Nov. 1 1923 **191.8**	Oct. 1 1923 **190.8**	Nov. 1 1922 **182.3**	May 1 1920 **263.3**	July 1 1921 **159.8**
U.S. Bur. Lab. Stat. Retail food 1913 = 100	Oct. 1923 **150**	Sept. 1923 **149**	Oct. 1922 **143**	June 1920 **219**	Mar. 1922 **139**
Nat. Ind. Conf. Bd. Cost of living 1914 = 100	Oct. 1923 **164.1**	Sept. 1923 **163.4**	Oct. 1922 **157.1**	July 1920 **204.5**	Aug. 1922 **154.5**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population.

Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen and conductors on 105 street and interurban railways in the United States, operating more than 100 passenger cars each, and weighted according to number of cars.

Orders Seven per Cent Stock Issue.—The directors of the Public Service Corporation of New Jersey on Nov. 7 directed that an issue of the 7 per cent preferred stock be made totaling $11,000,000, which is approximately 12½ per cent of all outstanding shares. The stockholders of record Nov. 17 have the option to take such stock at par in proportion to their holdings. For each eight shares of stock held, common or preferred, the stockholders will be entitled to subscribe for one share of 7 per cent preferred stock. The stock may be paid for in full or in installments, one-tenth with the subscription and at least one-tenth on Feb. 1, 1924, and the first day of each month thereafter. The subscribers will be allowed on such payments interest at the rate of 6 per cent per annum to be accounted for at the time such stock is fully paid for.

Company Is Insolvent.—C. A. Fagan, receiver of the Pittsburgh Railways, has filed a report with the United States District Court at Pittsburgh stating that his company is still "manifestly insolvent" and not in a condition to be returned to its owners in a reorganized state. Mr. Fagan is acting independently of his collegues, U. D. George and S. L. Tone. Mr. Fagan took issue with Special Master Wasson, who predicted that a surplus of $264,987 would be shown for the end of the first year after the lifting of the receivership. Mr. Fagan believes that a deficit of at least $1,549,194 would appear.

Preferred Stock Issue Approved.—The Wisconsin Railroad Commission has placed its approval on the proposal of the Eastern Wisconsin Electric Company to issue $40,000 of preferred stock for the purpose of securing funds with which to pay for additions and extensions.

First Report Since Reorganization Submitted.—Commissioner Paul H. Maloney of the Department of Public Utilities of New Orleans has submitted to the Commission Council the first annual report of the Public Service, Inc., since reorganization. It covers the trial period of one year, during which it was agreed that the company was to earn a return of 7½ per cent on a valuation fixed by the city. The returns of the corporation for the year show that the net profits were only 6.69 per cent. No comment was made by Commissioner Maloney upon the report in submitting it to the Commission Council, other than the announcement that the figures are now being gone over by the Auditing Department of the city, and that the report will soon be available.

Seeks Authority for Issue.—The Oklahoma City-Shawnee Interurban Railway has applied to the Interstate Commerce Commission for authority to operate the 38 miles of main track and other properties acquired at a receivers' sale on Sept. 28, and for authority to issue common stock and first mortgage bonds to the extent of $800,000 each to be delivered in payment to H. R. Hudson for the title to the railroad. The stock is to be full paid, non-assessable, of a par value of $100 per share. The bonds are to be issued for twenty years in denominations of $1,000, to bear interest at 6 per cent. The application is signed by C. A. Birge, president; Ernest Warley, secretary; and E. W. Shartel, attorney.

Income Increases.—For the first nine months of the current year the Twin City Rapid Transit Company, Minneapolis, reports gross revenues of $10,210,796, against $10,251,795 for the first nine months of 1922. Operating expenses were $7,455,143 for the nine months period last year and this year they were $7,267,192. The net income increased from $1,044,509 for the January-September period in 1922 to $1,151,756 for the same nine months of the present year.

Line Bought.—The Pennsylvania-New Jersey Railroad, a 26-mile branch line from Bristol to Doylestown, Pa., was recently bought by the S. Snyder Corporation, Rochester, N. Y. Salvaging of the line will be begun soon. The purchasers acquired all the track, overhead wires, culverts and stations of the Bristol road, in addition one $50,000 steel bridge. The Bristol-Doylestown branch was bought by the Pennsylvania-New Jersey Railroad for about $550,000 in 1912. Automobile competition has been instrumental in the suspension of the railway service.

Preferred Stock Offered.—W. A. Harriman & Company and Dominick & Dominick, New York, are offering at 89½ flat to yield more than 7.8 per cent, $4,000,000 of the West Penn Company, 7 per cent cumulative preferred stock. The preferred stock is redeemable as a whole or in part on any dividend date on thirty days notice, at 115 and accrued dividends. The West Penn Company owns directly or through subsidiaries substantially all the common stock of the company, constituting the West Penn system. This system is the largest unit in the group of public utilities, controlled by the American Water Works & Electric Company, Inc. The railway comprises 520 miles of track.

Bonds Offered.—W. C. Langley & Company and John Nickerson & Company, New York, are offering at 94½ and accrued interest to yield about 7 per cent $1,200,000 of the Mississippi Power & Light Company first and refunding mortgage sinking fund gold bonds, known as series A, 6½ per cent. The bonds are dated June 1, 1923, and are due June 1, 1943. The Mississippi Power & Light Company was organized recently to acquire and merge a group of properties which furnish the entire light and power service in Jackson, Vicksburg and several other communities in Mississippi, also railway service in Jackson, Vicksburg, and Greenville. The proceeds from the sale of these bonds and from the sale of preferred stock will be used to pay for additions, extensions and improvements to the properties of the company, to retire certain underlying obligations for other corporate purposes.

Certificates Offered.—Stone & Webster, Inc., will offer $1,115,000 of Electric Railway Equipment Securities Corporation 6 per cent equipment trust gold certificates, known as the trust of Nov. 1, 1923. These certificates are to be dated Nov. 1, 1923, and will be payable in serial installments Feb. 1, 1924, to Oct. 1, 1928, both inclusive.

Stockholders to Meet.—A meeting of the stockholders of the St. Charles Street Railway has been called for Dec. 12, when that utility, the New Orleans Gas Light Company and the New Orleans & Carrolton Railway, whose stockholders will meet subsequently, will be amalgamated with the New Orleans Public Service, Inc. There are only a few shares of these companies outstanding at the present time, the combination being simply a matter of form, as the merging of the utilities named was provided for when a reorganization of the companies was effected. Carrying out of the plan has been delayed by legal technicalities.

Dividend Declared.—The first dividend to be declared on the second preferred stock of the Portland Railway, Light & Power Company, Portland, Ore., amounted to 1½ per cent. This is payable Dec. 1, to holders of record Nov. 17. The second preferred stock is a 6 per cent non-cumulative issue.

Must Pay Taxes.—Despite protests, the Wisconsin-Minnesota Light & Power Company will be required to pay taxes on property in Chippewa Falls although it is not being used and of no revenue producing value. This decision was handed down by the Wisconsin Tax Commission which sustained the opinion of the city tax assessor, who placed a value of $95,000 on the property. The company held that this assessment was illegal in that the property was not being used due to the fact that high water in the river in the spring of 1918 damaged the flume which supplied water for power producing purposes from the river to the electric light plant, causing the property to be abandoned shortly thereafter. The city sought to compel the company to pay taxes on the property since 1919, but the commission invalidated this point, allowing the city, however, to place this property on its tax rolls as of 1923 for taxation purposes.

Seeks Bill Dismissal.—The Chicago Railways has opened its case in the Federal courts to dismiss a bill of equity filed by a protective committee of holders of the series 1 participation certificates. These certificates required the company to show cause why $1,478,400 in cumulated dividends had not been paid. The counsel for the company claimed that there was no money to pay dividends because the earnings had been used for capital expenditure. Attorney for the participation holders asserted that bonds should have been issued to provide for capital expenditures and that the certificate holders had a prior claim on the earnings. Dividends on the series 1 participation certificates have been in arrears since 1917.

Traffic and Transportation

Would Settle Out of Court

Committee of Citizens at Houston Advances Plan for Straightening Out Transportation Tangle

The Houston Electric Company's court case for an injunction to prevent the city from enforcing the present fare ordinance has again been postponed, this time until Nov. 21. This postponement was granted at the request of a committee of citizens who are endeavoring to settle the case out of court.

John A. Beeler, New York, the expert employed by the city, in his report to the city stated that the jitney was the greatest obstacle to an adequate railway system in Houston.

It is Mr. Beeler's opinion that Houston offers a field for both the electric railway and buses, but that both systems should be controlled by one company so that the two systems could be co-ordinated and duplicate service thereby avoided. With this thought in mind, he recommends that the present jitneys be abolished and that the Houston Electric Company be required to establish bus lines wherever they may be needed.

The report recommends several changes in the present operation of the railway system in order to speed up the cars and increase the earnings. The suggestions include several minor changes in present cross-town lines and track layout, the use of one-man cars, double berthing and use of street collectors in the downtown district, a reduction in number of stops per mile (at present cars stop at every corner or about every 250 ft.), and a change in the transfer system so as to reduce the misuse of transfers.

Acting on these recommendations a group of citizens, calling themselves the Citizens' Committee, filed a report with the City Council recommending settlement of fare litigation along the following lines.

Fare case to be suspended pending jitney election. If elimination of jitneys is voted company and city will agree to:

1. Drop fare case.
2. Begin bus operation on Austin Street immediately.
3. Put into effect all of Mr. Beeler's service and operating recommendations within a year.

It is estimated that the immediate improvements will cost $450,000. The agreement further provides that the Houston Electric Company shall in addition expend $250,000 during 1924, $375,000 during 1925 and $375,000 during 1926 for extensions and bus lines which are detailed in the report.

It is interesting to note that Mr. Beeler states in his report that twelve of the nineteen car lines now in operation are not self-sustaining, while some of the lines have been losing money for years. His final report supplements the one presented to the City Council. It was addressed to the Citizens' Committee and the public. The report follows substantially in full:

To substitute for Houston's present dual system of transportation, now part railway and part jitney, all railway or all jitney affords opportunity for further interesting comparisons that should be understood by the users, taxpayers and public generally, in order that the merits of the respective methods may be weighed so as to determine what the best plan for the community may be.

To handle the city's combined load by the jitney alone, some new problems are presented, as from 1,500 to 1,800 jitneys will be required during the maximum rush hour.

New elements will enter into the operation, some of which will have a tendency to raise present operating costs. The service will have to be organized under a corporation or central control in order that the outlying and sparsely settled non-paying section will receive necessary service, and such a large force of men will call for a systematic and close supervision in order properly to schedule and control the service.

This will require a well-organized force of supervisors as between 2,250 and 2,700 drivers alone will be employed. Accidents and insurance costs will rise, and schedule speed will be decreased on account of the congestion.

Our report shows that the longer haul of the car rider, on the present jitney fare basis, calls for an 8.67-cent fare. With these increases in operating costs, it is safe to say that with the whole city covered, the fare will have to be very close to 10 cents. This will bring the riders' annual bill up to $4,000,000, or about $1,500,000 more than the railway charges under the present rate of fare.

Other items of expense should be considered, even though they may be indirect. Many streets now unpaved will have to be improved in order to permit of the extension of this method of service. This item is likely to run into large figures, and will all be at the expense of the property owners and the city.

In addition to this, increased wear and tear on the streets already paved will result from the tremendous increase in traffic. More traffic officers will be necessary to control the increased traffic. All of these items will increase the cost of operating the municipality, and must be met by increased taxation, so that these indirect costs will still further augment the total cost of the city's local transportation should the jitney be adopted.

With the great number of jitneys on the streets, the congestion will become most acute, especially in the downtown business district, and all traffic will be retarded, including that of jitneys itself. Thus it will lose a portion at least of what is now its chief asset—fast speed.

At the intersection of Travis and Franklin the 146 street car movements through this intersection will require 1,946 jitney movements per hour to give the same passenger capacity. The present vehicular flow at this intersection is 1,314 per hour. By combining the two, 3,260 vehicular movements result. This will give a fair idea of conditions that will pertain to this and the other downtown corners under the jitney method.

On the other hand, properly to care for the jitney passengers in addition to its present patronage, it will be necessary to place in daily operation twenty-eight additional cars.

The cost of the improvements as specified in our report to the Mayor and Commission Council, submitted Nov. 5, 1923, and the establishment of the bus line to Southmore, is estimated to be $438,000. Concerning the other extensions of service that may be desirable, the cost and effect upon the company's net earnings must be given consideration, as capital expenditure must not be allowed to expand too rapidly.

The time required to obtain new cars, construct the additional track and remodel the present equipment, recommended in our report, will require from six to eight months. As these are necessary to the complete carrying out of the revised plan, the full benefit resulting from the operating economies cannot be obtained until this is done. Therefore, steps should be taken to secure these improvements forthwith.

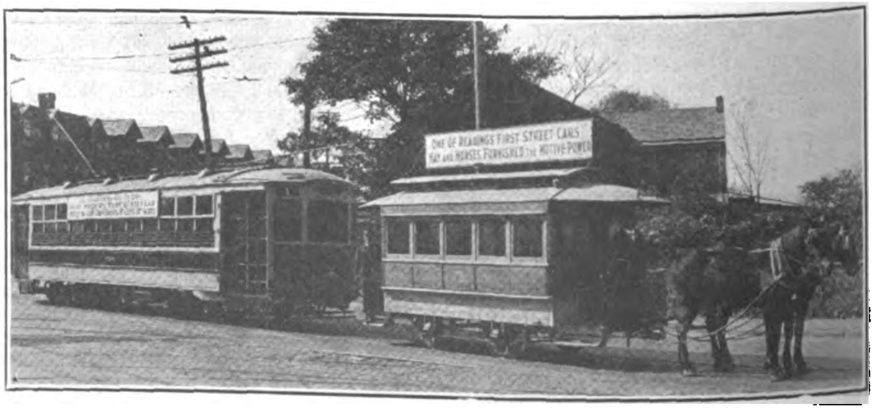
Since 1913, the net income has not been what it should be to insure the perpetuation of the system as the relation of capital to operating revenues and net earnings fails to follow proportionally the investment as shown in the record cost, and which it must do if the system is to continue to remain self-sustaining.

In making all future additions to the plant and equipment and extending the service, we cannot emphasize too strongly that extreme care must be exercised by the city to see that the capitalization of the company is not unduly expanded; this is especially true in connection with the building and operating of the extensions. At present the company is operating nineteen lines. Twelve of these lines are not self-sustaining. Six of these lines are operating in sparsely settled districts; some of them have been losing money for years, and many undoubtedly will continue to do so indefinitely.

The remedy, as we have already pointed out, lies in combining and co-ordinating the two methods into one comprehensive plan of transportation. These two forms of transportation should not be competitive and destructive, so that one system breaks down the other, but in every case the method best suited to the requirements of the section to be served should be employed. Thus under proper regulation a broad and constructive policy may be adopted, making practical economical and efficient operation of this important public utility. This will build for permanency and future development of the city's transportation requirements.

Should the city see fit to adopt the suggestions we have made, and relieve the railway of the jitney competition, then there will rest upon the company a most sacred duty to furnish rapid, ample efficient service, commensurate with the traffic demands of this city. Failure upon the part of the company to do this will invite a return of jitney competition and will constitute on the company's part a flagrant violation of the solemn obligation which it owes the public.

Reading Rejoices


ONE OF READINGS FIRST STREET CARS
HAY AND HORSES FURNISHED THE MOTIVE POWER

READING TRANSIT & LIGHT COMPANY'S CONTRIBUTION TO THE RECENT CELEBRATION COMMEMORATING THE ONE HUNDRED AND SEVENTY-FIFTH ANNIVERSARY OF THE FOUNDING OF THE CITY OF READING, PA.

The recommendations for additional street car service in the event jitney traffic is discontinued include increased service by large one-man cars on the West End-Pierce, Heights-South End and Harrisburg and Central Park lines and by small one-man cars on the North Main-Leeland, Woodland-La Branch and Mandell-North Main lines. This would add twenty-six cars and 204 car-hours to the daily schedule.

The estimated cost of improvements which, it is asserted, should be made right away, is given as follows:

Building 3.66 miles of track with necessary connections and special work, $163,000.

Purchase of fifteen double-truck one-man cars, $180,000.

Remodeling platforms and doors of fifty-three cars to permit separate entrance and exit of passengers, $45,000.

Purchase of five modern buses with garage facilities, $50,000.

Only an Eight-Cent Fare Will Save Buffalo Company

Unless the International Railway, Buffalo, is permitted to charge an 8-cent fare on its local lines, the company will face a deficit of $145,900 the next fiscal year. Witnesses for the railway testified to this effect before the Public Service Commission at the resumption of hearings on its plea for a higher rate of fare in Buffalo. It was testified that if an 8-cent fare is charged in 1924 the net income of the International would be $419,000. The present fare of 7 cents, or four tokens for 25 cents, would yield the International, it was testified, an operating income of $10,935,700, while an 8-cent fare would yield an operating income of $11,530,900. Gross income on the present 7-cent fare next year was estimated at $1,383,000, as against $1,958,400 on an 8-cent fare.

Additional evidence tending to support the company's claim that its system is valued at $98,000,000 was presented by expert witnesses for the railway. A. E. Hibner, valuation manager of the International, and W. K. Meyers, vice-president of finance of the Philadelphia (Pa.) Rapid Transit Company, were among the witnesses. Mr. Hibner testified that the reproductive cost of the entire International system, including interurban lines, would exceed $100,000,000.

One-Man Cars and No Transfers Saves Brooklyn Line

The Transit Commission, acting under the authority of Chapter 748 of the Laws of 1923, has issued a special permission to the Nassau Electric Railroad of the B.-M. T. system to operate the Park Avenue Line, in Brooklyn, without transfers, for another year from Nov. 2, 1923.

Last year, acting under authority of a legislative act of 1922, the commission authorized the company to reopen the line for service after a shutdown of about two years, following the strike of 1920. Receiver Garrison was directed by the courts not to resume operation of some of the deficit-making lines. Hence the Park Avenue line was shut down until legislative enactment permitted its resumption with one-man cars without the extra expense of a widespread transfer system.

The line begins at Central Avenue and Cooper Street and terminates at the Sands Street, Brooklyn, end of the Brooklyn Bridge. It issues and accepts transfers good across the Brooklyn Bridge, a total ride of about 6 miles from Manhattan to the Bushwick terminus.

Freight Service to Be Continued by Wisconsin Road

The Eastern Wisconsin Electric Company will contnue to furnish freight and express service between Neenah and Fond du Lac in connection with its interurban passenger service. This service, recently established, aroused the ire of business men and residents of the city to ask the Council for its abolishment on the score that further operation of this service through the main business district was detrimental to the well being of the city and lowered abutting property values. Representatives of business houses suggested that the company build a suitable terminal in the outskirts.

Urges Washington Traffic Study

Appearing before the United States Senate committee on traffic of the District of Columbia on Nov. 20, J. Rowland Bibbins, consulting engineer, Washington, D. C., recommended that a thorough engineering survey of traffic and transportation in the district be be made. The object would be to determine basic facts now entirely unavailable which would be obtained to inform Congress and the District of the need for improvements and for use in working out a definite program fundamentally sound as well as flexible. A similar recommendation had already been made to the committee by W. F. Ham, president Washington Railway & Electric Company. Mr. Bibbins urged that this survey should be made under the jurisdiction of the engineer-commissioner of the District so that the fund of engineering data already in the hands of the commission could be utilized and continuity of effort thus be secured.

Mr. Bibbins urged that Washington should take the lead in solving its traffic problems as it has been looked upon as the model city of America. In common with all other cities, Washington is faced with the necessity of devising ways to speed up the movement of street cars and vehicles generally.

Rail Service Replaced by Bus

At a recent meeting of the City Council of Streator, Ill., the Public Service Company of Northern Illinois was granted permission to cease railway operation and tear up the tracks of the Illinois Light & Traction Company. As stipulated in the agreement the Public Service Company guaranteed satisfactory bus service for the next five years. At the same meeting an independent company, known as the Yellow Bus Company, was authorized to take up operation with a view toward supplying the citizens with adequate bus service. If this company fails in its attempt, the Public Service Company of Northern Illinois will see to it that some other bus operator gives service in the community. The railway in Streator is one of the oldest in Illinois. It established service thirty-three years ago.

Bus System Proposed for Jersey Shore Towns

Application has been made to the Board of Commissioners for permission to operate a $200,000 intercity bus system at Asbury Park. The applicant was George B. Cade, assistant to the secretary of the Atlantic Coast Electric Railway, operating from Pleasure Bay to Sea Girt and the belt system at Asbury Park. The application was made for the Atlantic Coast Transportation Company, a subsidiary of the Atlantic Coast Electric Railway, the officers of which will comprise the personnel of the new concern. It is said that the plans for operating buses include four intercity systems. Mr. Cade said that operation of the railway belt line service in Asbury Park may be suspended during the winter months and buses substituted.

Use of Bus Planned by Hartford & Springfield Line

J. T. Hambleton, general manager of the Hartford & Springfield Street Railway, has asked the city transportation board of Springfield, Mass., for a franchise to operate buses from that city to Suffield, Conn., in place of trolley cars, operation of which it is proposed to discontinue north of Suffield. This is said to be the first step in a plan for the installing of buses over the entire west side route of the Hartford & Springfield, thereby enabling the company to end the railway service and remove the tracks and wires which furnish connections between the Springfield Street Railway and the lines of the Connecticut Company on the west side of the river.

Mr. Hambleton told the transportation board that the entire equipment on the west side was becoming unfit for use and that the company had no funds for replacements. Earnings of the company so far this year are only 70 per cent of the earnings last year. He asked for a quick decision by the city.

The proposed arrangement is subject to approval by the receiver, H. B. Freeman, Hartford, and the bondholders, but no objections are anticipated from these sources. The Springfield Street Railway has indicated that it will not object to the proposed bus service provided it does not offer competition with that company between Springfield and Suffield.

Mr. Hambleton has received encouragement from the Springfield authorities, and he believes the Agawam, Mass., and Suffield, Conn., Selectmen will give their approval, in which event it is hoped the bus service can be started by Dec. 1.

Personal Items

H. C. De Camp Leaves Dayton

Former Assistant General Manager to Devote Himself to Promotion of One-Man Car Operation

H. C. De Camp, the work for which he went to Dayton, Ohio, completed, has resigned as assistant general manager of the City Railway to promote the efficient and economical operation of one-man cars. The Dayton work consisted of converting the system there to 100 per cent one-man operation, with double-truck cars. Upon it Mr. De Camp entered in July, 1921, and physically the change had been made by June of this year, but a few touches still remained then to perfect operation with the new equipment.

SERVICE SAVED TO DAYTON

Between the dates mentioned more than twenty-six cars were rebuilt, and all other details were worked out successfully which go with a physical change of this magnitude. Economies in management had to be introduced if the City Railway and a 5-cent fare were to be saved to the people of Dayton. Through the change to one-man operation it was possible to reduce the number of trainmen from 240 to 126, replace all regular runs on a car-for-car basis and add trippers so that service to the public actually was bettered. The story of this change in equipment to one-man operation as carried out at Dayton is a mighty interesting one. Mr. De Camp himself was induced to tell it for the benefit of others in an illustrated article which appeared in the ELECTRIC RAILWAY JOURNAL for Nov. 10, page 809.

Before going to Dayton Mr. De Camp had been with the railway department of the Westinghouse company in the Cincinnati office for eleven years. So long had he been engaged in production that even those who knew him well had come to look upon Mr. De Camp primarily as representing the sales end of the business.

MR. DE CAMP AN AUTHOR

As a matter of fact the transportation end of the business has always had a strong appeal for him, and he has a fund of both railway operating and selling experience at his command. He started with the General Electric Company several years ago, but later went over to the operating end, serving with the old Utica & Mohawk Valley Railway, the Brooklyn Rapid Transit and the Third Avenue Railway. Then followed his long sales connection. During all that time, however, Mr. De Camp kept up his interest in the operating field, particularly along the lines of efficiency in management.

Mr. De Camp has never lost the common touch, as Mr. Kipling puts it. He has always felt that the trainmen have received less attention than they deserved and so he wrote a series of "Letters of a Retired Motorman to His Son." If it is a test of literature to strike a sympathetic chord, then these letters come pretty close to being literature. Ever since he has been in the Central West Mr. De Camp has been active in the affairs of the Central Electric Railway Association. At the 1920 cruise of the association he was "parson," and at the meeting last January he presented the paper "Emergency Stops," which resulted in the tests made later near Indianapolis and reported in the ELECTRIC RAILWAY JOURNAL.

H. C. De Camp

A. S. Coleman, manager of the Alabama Power Company's office in Gadsden, has become district manager at Montgomery. He has been succeeded at Gadsden by J. O. Henkel, Jr., who has been manager of the eastern division at Anniston.

George W. Scott has succeeded Ralph Chandler as second vice-president of the Phoenix Railway, Phoenix, Ariz. L. M. Ford is now treasurer, replacing A. D. Haskell, acting in that capacity. Both officials are located in Los Angeles.

Charles B. Cooke, Jr., has succeeded Franklin P. Jones as president of the West Chester Street Railway, West Chester, Pa. Thomas L. Hodge has been made treasurer, replacing M. G. Woodside.

Robert J. Costigan is claim agent of the Trenton & Mercer County Traction Corporation, Trenton, N. J. The duties of claim agent were formerly performed by Edward J. Peartree, general manager.

John N. Duerr, North Tonawanda, has been promoted to the position of general superintendent of the Buffalo-Lockport interurban division of the International Railway, Buffalo. Mr. Duerr has been in the employ of the International for twelve years. For some time he has been assistant superintendent of the Buffalo-Lockport division.

W. H. Evans, Wilkes-Barre, has been selected as the general superintendent of the Williamsport Passenger Railway and the Jersey Shore Street Railway. The position has been vacant more than three months.

W. Stewart has been made assistant treasurer of the Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va.

M. J. Binkley has been made secretary of the Buffalo & Lake Erie Traction Company, Erie, Pa.

F. A. Clark will resign as superintendent of power of the City Light & Traction Company, Sedalia, Mo., to take a position in the construction department of Henry L. Doherty & Company at Washington, Pa.

Douglas Shaw, Madison, treasurer of the Wisconsin River Power Company, Madison, formerly vice-chairman of the accounting division of the Wisconsin Utilities Association, was elected chairman of that division at the closing session of a two-day conference of heads of accounting departments, held in Madison, on Oct. 23 and 24. He succeeds Emil Jorgenson of the Wisconsin Gas & Electric Company, Racine, who recently tendered his resignation

Rawson Collier, for some years prominently connected with the Georgia Railway & Power Company, but for the past two years with the Hudson River Gas Company, Poughkeepsie, N. Y., has resigned the latter post and will return to Atlanta as representative for Dwight P. Robinson & Company. He is a brother of Charles Collier, sales manager for the Georgia Railway & Power Company.

Obituary

Edward C. Crosby, former builder of street railways in Vermont and Massachusetts, died in Brattleboro, Vt., on Nov. 2. He was born in Marlboro, Vt., in 1846. In 1895 he built the Brattleboro Street Railway and in 1897 the Springfield (Vt.) Street Railway. In the early '90s he took a leading part in the building of lines from Northampton to Amherst and Greenfield, Mass. When several of these roads were combined in the Connecticut Valley system he became chairman of the board of directors. He represented Brattleboro in the Legislature in 1912 and was elected State Senator last year.

James W. Sale, president of the Marion & Bluffton Traction Company since 1914, died recently at Easthaven Hospital, Richmond, Ind. He was sixty-five years old. Aside from his connection with the Marion & Bluffton Traction Company, Mr. Sale was prominently identfied with other business enterprises throughout the state and was active in politics.

Samuel W. McCall, ex-Governor of Massachusetts and a member of the board of public trustees of the Eastern Massachusetts Street Railway, died recently at Winchester, Mass.

William J. Lloyd, general superintendent of the West Lynn works of the General Electric Company, died suddenly on Oct. 28 in an automobile as he and friends were entering the grounds of the Tedesco Country Club. For several years he was connected with the Westinghouse Company, but for the past twenty-five years he had been with the General Electric Company, four years of this period being spent at the plant of the British Thomson-Houston Company at Rugby, England. Mr. Lloyd for several years was at the Pittsfield works of the General Electric Company and about twelve years ago was transferred to Lynn. He assisted in establishing a plant of the company in Australia about four years ago, returning again to the Lynn works. In July, 1922, he was made general superintendent of the West Lynn works.

Clifford Thorne, noted attorney and authority on railroad subjects, died in London on Nov. 13. Mr. Thorne was a member from 1910 to 1917 of the Iowa Board of Railway Commissioners and chairman for the last five years of his service. He was president of the National Association of Railway Commissioners in 1914 and 1915. He was a member of the American Bar Association, of the American Economics Association and the American Academy of Political and Social Science. Mr. Thorne's expertness in questions of economics brought him into prominence as a contributor to various magazines.

Changes Proposed in New York Rapid Transit Routes

The Board of Estimate of New York has before it a proposal for changes in the route of the West Side extension of the Brooklyn-Manhattan Transit Corporation subway that have been adopted by the Transit Commission. If the board aproves the modifications the new subway will be constructed under Central Park instead of under Central Park West, and will go north between 110th and 125th Streets under Eighth and St. Nicholas Avenues instead of under Manhattan Avenue. It is estimated that the change will result in a saving of $2,500,000 to the city. The Transit Commission has also modified the West Side route so that it will extend from its original terminus, 162d Street, under St. Nicholas Avenue to Fort Washington Avenue at West 175th Street. The line will have four tracks and be under ground all the way. To be effective, these changes must be ratified by the Board of Estimate, which is expected to act on the new proposals some time next week.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Railway Supply Manufacturers Will Hold Convention

At a meeting of the executive committee of the Railway Supply Manufacturers' Association, held in conjunction with the American Railway Association, mechanical division, Master Car Builders-Master Mechanics, held in New York City on Nov. 8, 1923, it was mutually arranged that a convention and exhibition would be held in Atlantic City, N. J., June 11-18, 1924.

Slack Demand for Steel Castings

October bookings of steel castings by companies representing more than two-thirds of the commercial-castings capacity of the United States amounted to 37,446 tons, as against 47,574 tons in September. The accompanying table shows the bookings of commercial steel castings for the past ten months by sixty-five identical companies, with a monthly capacity of 96,900 tons, of which 38,300 tons are usually devoted to railway specialties and 58,600 tons to miscellaneous castings.

	Total		Railway Specialties	
Month 1923	Net Tons	Per Cent of Capacity	Net Tons	Per Cent of Capacity
January	100,605	103.8	47,879	125.0
February	90,152	93.0	39,845	104.0
March	143,564	148.2	76,409	199.5
April	90,968	93.9	39,610	103.4
May	89,493	92.4	38,788	101.3
June	84,878	87.6	42,773	111.7
July*	52,066	53.7	16,741	43.7
August	50,515	52.1	18,332	47.9
September	47,574	49.1	21,685	56.6
October	37,446	38.6	9,840	25.7

* Two companies with a capacity of 785 tons per month on miscellaneous castings now out of business.

October Cement Output Sets Record

The production of portland cement in the United States during the month of October was greater than in any other month this year or during 1922. Compared with the same month a year ago, the figures were 13,350,000 bbl. for 1923 and 12,287,000 bbl. for 1922. In fact, the total production for the first ten months of 1923 is very nearly equal to that for the whole of the year 1922.

Heavy Shipments of Paving Brick Continue

According to the National Paving Brick Manufacturers' Association the paving season is running later in the fall this year than is customary. This is indicated by the continued heavy shipments of vitrified paving brick for the month of October, which were 34,287,000 as against 34,761,000 for September. Total number of brick manufactured was 34,317,000 for October and 34,457,000 for September. Stock on hand was reported at 76,613,000 for October as against 86,530,000 for September. It is thought that this unusual fall activity is the result of a wet spring and a late start to the paving season.

Maintains Carbolineum Is Always Available at Fair Price

The Carbolineum Wood Preserving Company, Milwaukee, Wis., has written the editors of the JOURNAL commenting that it was gratifying to note in the report of the American Electric Railway Engineering Association wood preservation committee, published in the JOURNAL, that the committee confirmed the report of the previous committee in acknowledging carbolineum as the most suitable preservative for brush treatment of wood poles. The manufacturer wished to differ, however, with a subsequent statement made by the committee that carbolineum was not always obtainable at a reasonable cost.

The manufacturer states that, calculating at the highest prices for carbolineum and labor, the cost of brush treating a pole is not more than 50 cents. When it is considered that the pole costs from $7 to $10, at present, and that the brush treatment will give an additional life of at least 100 per cent under the most severe exposure, the 50 cents extra cost for brush treatment, even at highest prices, is certainly justified. The manufacturer says that it is difficult to understand why any one should try to economize in this process by using a cheaper material. It is claimed that in many years' experience customers of this company have rarely objected to the price. In ninety cases out of a hundred they have simply asked for the manufacturer's standard material.

Metal, Coal and Material Prices

Metals—New York	Nov. 20, 1923
Copper, electrolytic, cents per lb.	13.00
Copper wire base, cents per lb.	15.50
Lead, cents per lb.	6.90
Zinc, cents per lb.	6.25
Tin, Straits, cents per lb.	44.875
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.425
Somerset mine run, Boston, net tons	2.375
Pittsburgh mine run, Pittsburgh, net tons	1.925
Franklin, Ill., screenings, Chicago, net tons	1.45
Central, Ill., screenings, Chicago, net tons	0.85
Kansas screenings, Kansas City, net tons	2.00
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$6.50
Weatherproof wire base, N. Y., cents per lb.	16.50
Cement, Chicago net prices, without bags	$2.10
Linseed oil (5-bbl. lots), N. Y., per gal.	$0.94
White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots	11.25
Turpentine, (bbl. lots), N. Y., per gal.	$0.94

Rolling Stock

Schenectady Railway is overhauling most of its equipment. Many cars are in the shops being entirely rebuilt except for the steel underframe. New bodies will take the place of the old.

Southwestern Traction Company, Temple, Tex., has remodeled its passenger cars, converting them into one-man cars with a pay-as-you-enter feature. The converted cars were put in operation on Nov. 5.

Des Moines City Railway will receive in December the first of the twenty-five new steel cars ordered some time ago.

Montreal Tramways has purchased fourteen one-man Birney safety cars from the F. B. Cutter Company, New York City. These cars are the first of this type to be put in service in Montreal.

Department of Street Railways, Detroit, has placed orders for 100 new Peter Witt type cars which are to be equipped with safety car devices and are generally similar to the other cars of this type recently purchased for Detroit. The order has been divided equally between the McGuire Cummings Manufacturing Company and the Osgood Bradley Car Company. Delivery starting Feb. 28, 1924, is specified. The principal specifications follow:

Seating capacity	52
Bolster centers, length	23 ft. 9 in.
Length over all	48 ft. 5¼ in.
Width over all	8 ft. 4$\frac{1}{16}$ in.
Height, rail to trolley base	10 ft. 9¾ in.
Body	Semi-steel
Interior trim	Cherry
Headlining	Agasote
Roof	Arch
Air brakes	Not settled
Car signal system	Faraday
Control	K-35
Curtain fixtures	Curtain supply No. 88 Ring
Curtain material	Double-faced Pantasote
Destination signs	Hunter
Door-operating mechanism	Safety Car devices
Door engines	National pneumatic
Door signals	National Pneumatic safety interlocking
Fenders or wheelguards	H. B.
Hand brakes	Peacock staffless
Heater equipment	Gold nichrome wire
Headlights	H.D.B.-96 Root type
Lighting	Center with Electric Service Supplies fixtures and shades
Motors	Four G. E. 35 hp.
Paint	Pratt & Lambert
Sanders	Osgood Bradley
Sash fixtures	O. M. Edwards
Scrapers	Root No. 7 air operated
Tail lights	Nichols Lintern duplex
Trolley catchers	Ohio Brass No. 13141
Trolley base	Ohio Brass Company
Thermostat	Railway Utility
Trucks	Taylor
Ventilators	Railway Utility
Wheels	Rolled steel
Watt-hour meter	Sangamo

International Railway, Buffalo, has equipped 100 passenger cars on its local lines with scrapers or small snow plows which can be lowered to the rails during the winter as necessity arises. Announcement of this valuable addition to the company's snow-fighting equipment was made by Herbert G. Tulley, president of the International. Each line will be equipped with its share of these cars, so that the scrapers can be brought into play immediately snow starts to fall. The company's snow-fighting equipment, in addition to these cars, consists of fifty-four plows and sweepers. These have been thoroughly overhauled and are now assigned to the various carhouses throughout Buffalo for immediate service.

Track and Line

Philadelphia Rapid Transit Company has placed an order with the Union Switch & Signal Company for the material required for installation of an electro-pneumatic interlocking plant at Fortieth Street, on the Market Street Elevated Line. The interlocking consists of a crossover layout with complete signal protection and automatic stops involving eight working functions. Two of the signal levers will be equipped with Mercury automatic time releases to provide automatic time locking.

Southern Public Utilities Company, Winston-Salem, N. C., is making an extension from the end of the West Highland line to the Richard J. Reynolds High School.

New York, N. Y.—The Transit Commission has received bids for the construction of the tracks in the Jerome Avenue yard of the Interborough Rapid Transit Company near Jerome Avenue and Mosholu Parkway. The Slattery Engineering & Construction Company was the low bidder, offering to do the work at $59,879.

Jackson Railway & Light Company, Jackson, Tenn., has spent $70,000 this year in improving its track, buying new equipment and laying extra heavy rails. The East Jackson line, from Royal and Main Streets to the end of the line on East Preston, has been completely rebuilt. Extra heavy rails have been laid on Arlington Avenue from Highland to Prospect and a new curve has been built into the line at the corner of Arlington and Prospect. The North Royal line was also completely rebuilt. The superintendent recently announced that all track improvements for the year had been completed.

Power Houses, Shops and Buildings

West Jersey & Seashore Railroad, Camden, N. J., will purchase power hereafter from the Philadelphia Electric Company. Electricity generated in Philadelphia will be turned into the West Jersey & Seashore Railroad's third-rail line between Camden and Atlantic City early in December. Railroad officials more than a year ago found it would be cheaper to purchase power from the Philadelphia Electric Company, convey it to New Jersey over high-tension lines on the Delair Bridge and run it through substations to the railroad line than it would be to continue the generation of electricity at Westville, N. J. Part of the Westville plant will be used as a substation.

Trade Notes

Templeton, Kenly & Company, Ltd., Chicago, almost immediately after the quake had subsided, received cablegrams to rush to Japan quantities of No. 329 Simplex pole-pulling and pole-straightening jacks, which they were partially able to do through the stock maintained at San Francisco and by borrowing from the stocks of the Western Electric Company and other jobbers on the coast. Additional quantities were immediately dispatched from Chicago to San Francisco, and it is safe to predict that the telephone and power lines will be quickly restored through these first-aid tools.

William Porter White has been appointed to act as personal assistant to M. O. Troy, new executive assistant manager of the central station department of the General Electric Company. His headquarters will probably be at Schenectady in common with Mr. Troy. Mr. White is a graduate of Clemson College, class of 1906, whence he entered the student test course at the Pittsfield works of the General Electric Company. In 1908 he started work in the transformer engineering department there, where he received a thorough training in designing. In 1911 he was transferred to the transformer sales department at Schenectady and, in 1912, was placed in charge of exploitation and sale of feeder voltage regulators and generator voltage regulators. He received another promotion in 1913, taking charge of commercial engineering work in the transformer sales department at Pittsfield.

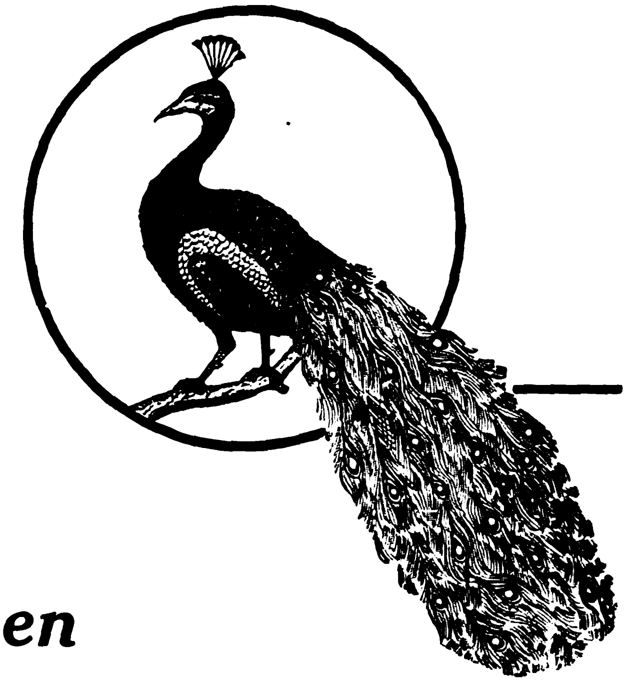
Bridgeport Brass Company announces the appointment of E. E. Helm as district manager at Detroit. Mr. Helm comes from Akron, where for two years he was manager of the Industrial Bureau of the Akron Chamber of Commerce. He is particularly well known in rubber and automobile trade circles by reason of his connection for five years with the Goodyear Tire & Rubber Company in publicity work.

New Advertising Literature

International Steel Tie Company, Cleveland, has issued a thirty-two page booklet on "Joints." It gives the laboratory and service data on the strength of rail joint on steel twin ties. The articles contained in the leaflet are reprinted from a recent issue of the ELECTRIC RAILWAY JOURNAL.

United Electric Company, Canton, Ohio, has issued a pamphlet, "Vacuum Cleaning Data for Architects and Engineers." The pamphlet states that the lack of a ready reference work on vacuum cleaning has been felt by architects and engineers. The demand for this compilation of information is evidenced, in the opinion of the company, by the fact that this pamphlet has reached its fifth edition.

After the limit of piston stroke is reached—
What then?



It may be due to slack in the rigging, or perhaps it's worn brake shoes. But whatever the cause, there sometimes comes a situation where you have to set the hand brake to hold the car. Multiply the length of piston stroke (plus a little extra) by the various leverage ratios and it makes a lot of chain for the hand brake to wind up. Ordinary brakes will simply jam.

That is the time when

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Peacock Staffless Brakes have almost unlimited chain-winding capacity

Hand brakes for modern cars are just as important today as they were before the days of air brakes. If installed at all—(and who would send out a car without emergency hand brakes)—they should be adequate to meet whatever emergency may arise.

Peacock Staffless Brakes possess ample facilities for winding any amount of chain to reach maximum brake power—up to 144 inches if necessary. They are therefore recognized as an invaluable adjunct to even the best air brake system.

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Journal would be appreciated.

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"Resiliency" the ① Principle

The 1923 Committee on Way Matters of the A.E.R.A. reported at the Atlantic City convention as follows:

"It was agreed that a substitute tie should meet the following requirements:

1. Resiliency.	The fundamental principle of the **DAYTON RESILIENT TIE.**
2. Hold rail to gage.	Held securely by bolts accurately located in steel cross members.
3. Provide sufficient bearing area.	By protecting the concrete from breaking or pulverizing, the Dayton Tie converts the entire roadbed into bearing surface.
4. If expected to last for more than one set of rails, that easily renewable fastenings be provided.	Readily accessible bolt fastenings provide for rail renewal.
5. Be easily installed by ordinary track workers.	Eight ordinary track laborers, by actual test, have laid 1,000 feet of Dayton Resilient track in a single day.
6. Cost installed should be reasonable.	Dayton Resilient Tie Track costs $2,000 per mile less than wood ties in gravel ballast.

DAYTON

Fundamental of the Dayton Tie

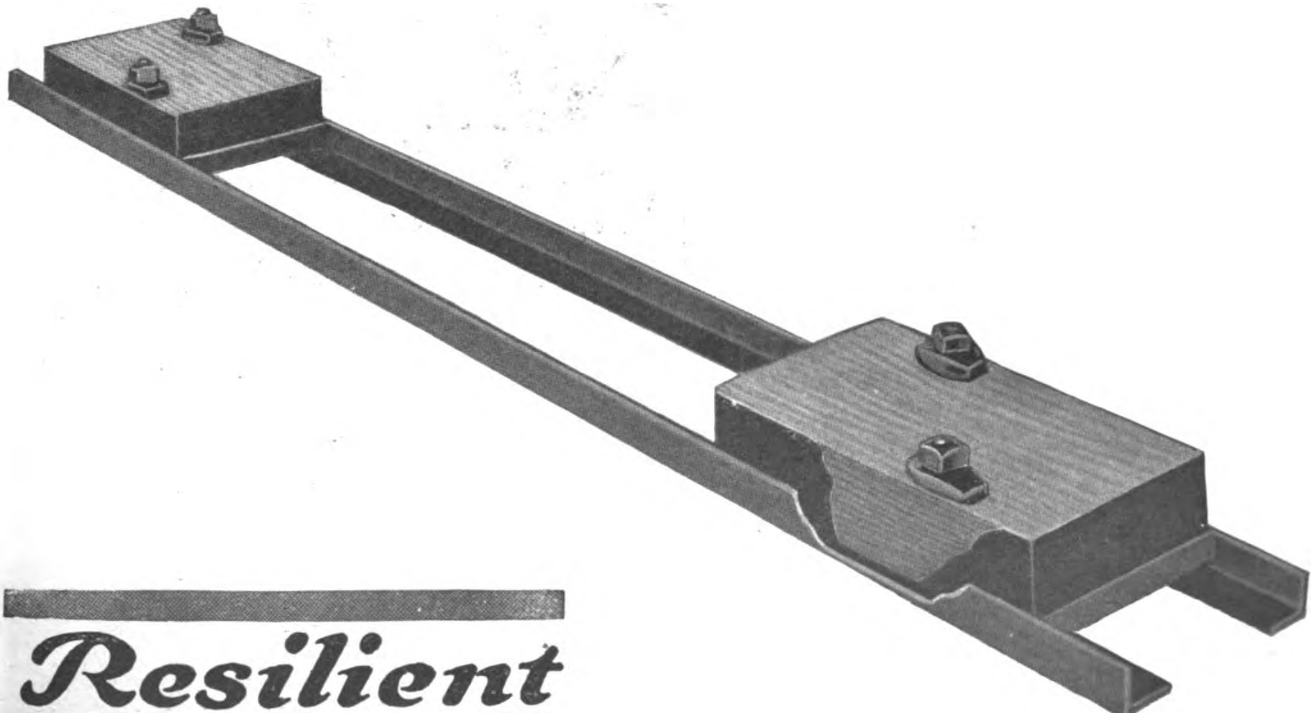
The Way Committee of the A. E. R. A. reported that a substitute tie should meet six requirements, the first of which, **Resiliency,** is the fundamental principle of the Dayton Tie.

Resiliency means "shock absorption," and is obtained in the Dayton Tie by the use of asphalt and wood, made in combination with steel and concrete.

The vibrations which are set up by a moving car and transmitted to the rail, are absorbed by the wood and asphalt, preventing the foundation from disintegrating.

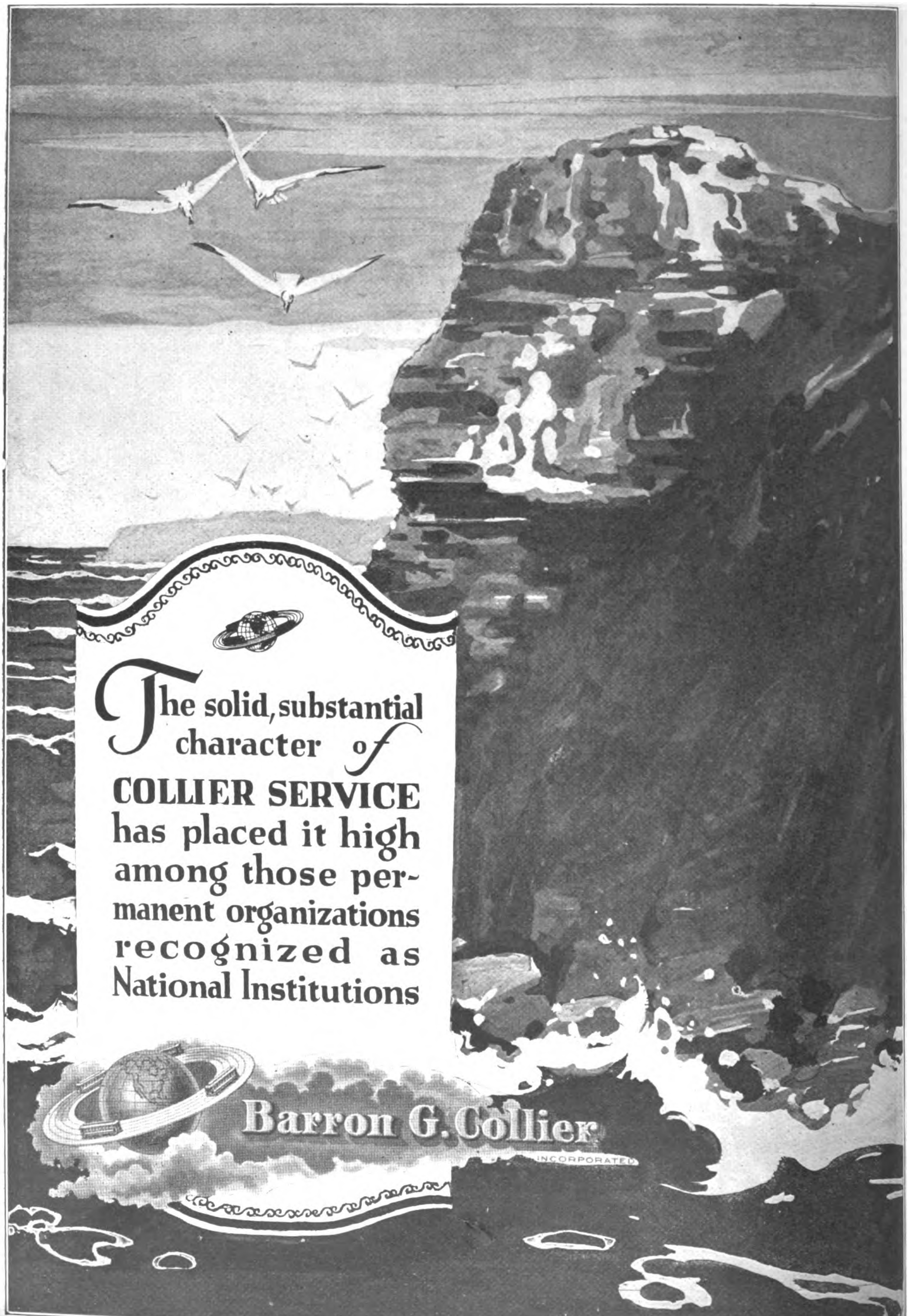
A concrete foundation is far better than stone or gravel when it is protected from the vibration of the cars, transmitted through the rail. Stone or gravel, under heavy loads, will soon disappear in the subsoil, thus leaving low places in the track. Concrete, however, with Dayton Ties, provides, with the street paving foundation, a slab construction that is protected against disintegration through its shock-absorbing qualities.

In our next advertisement we tell you how Dayton Resilient Ties "hold the rails to gage." Don't miss it!



Resilient TIE

THE DAYTON MECHANICAL TIE CO.
707 Commercial Bldg.
DAYTON, OHIO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You can figure for yourself the approximate cost, but we would like to submit a closely calculated estimate.

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You know that all Travelers life rates are low and guaranteed; but we would like to show just how low we have succeeded in getting these rates.

If you will but say the word we will send a representative who will help you compile the few details regarding your organization, your working quarters and your occupational hazards, if any, which we need for making such an estimate.

SAY THE WORD, by using the coupon below or by getting in touch by letter, telegram or telephone with the home office of The Travelers, or with one of our seventy-five branch offices, or with one of the thousands of agents and brokers representing The Travelers.

The
TRAVELERS
INSURANCE COMPANY
HARTFORD, CONNECTICUT

The Travelers Insurance Company
Hartford, Connecticut
Attention, Group Department

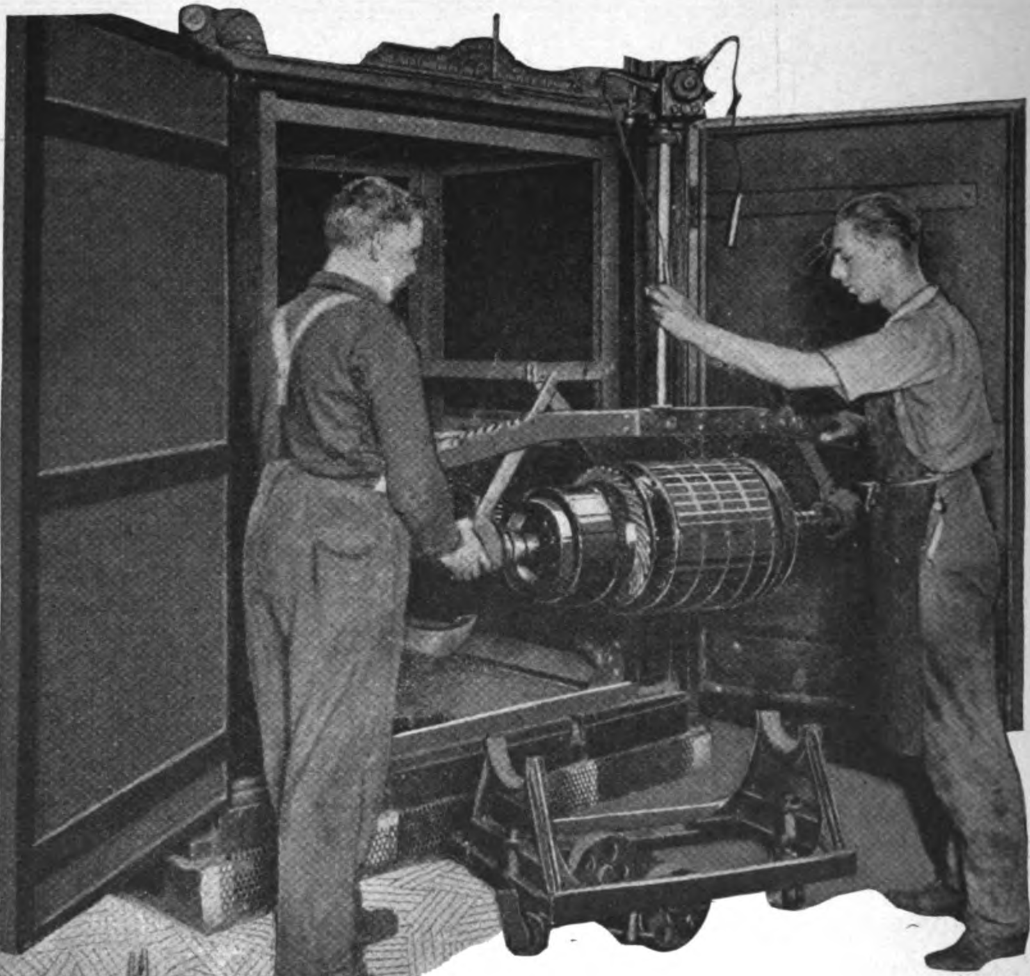
Without imposing any obligation upon us, you may send a representative for the information regarding the number, ages, and sex of employees, and other data you need for a computation of the cost of Group Insurance.

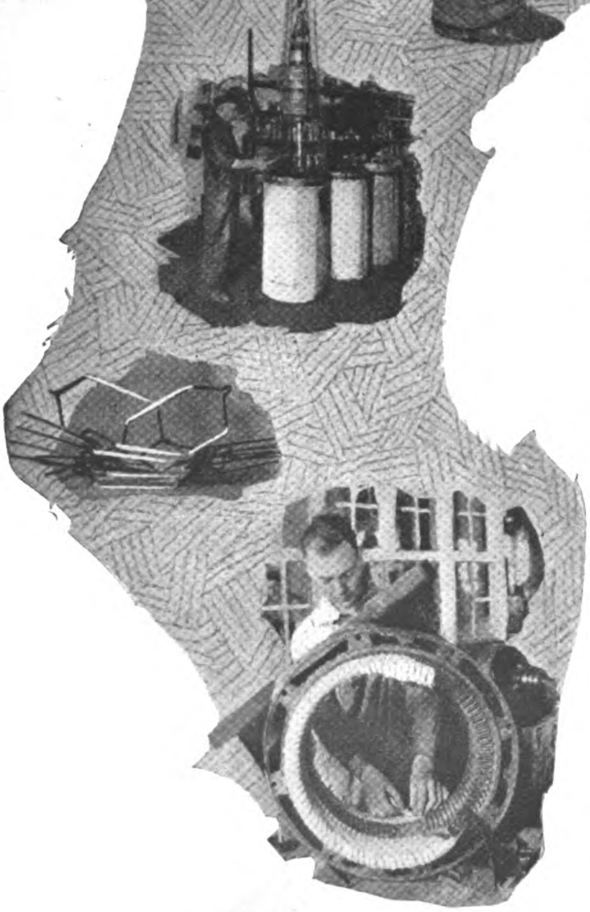
Corporate or Firm Name..

No.......... Street..

City.................................... State.................

Have him call on Mr........................ Title............





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"Irv-O-Slot" insulation consists of a layer of varnished cambric and one or more layers of fibrous paper solidly cemented together. Thicknesses from 12 mils to 30 mils. Dielectric strength of from 500 to 700 volts per mil. Saves the time of the armature winder. No waste as strips are cut to your order.

Irvington Black Varnished Cambric

Irvington Black Varnished Cambric has a 30% higher dielectric strength, 100% better heat resistance, 100% more alkali and acid resistance, 200% Better Aging Qualities, 200% more resistance to oil than yellow varnished cambric. It is ideal for winding coils.

Dipping and Baking

Dipping with Irvington Varnish and then baking will make your armatures good for many years' additional service. Prepare now for the heavy overloads of winter time operation. Place that order today. Our nearest sales representative will be prompt in serving you.

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Established 1905

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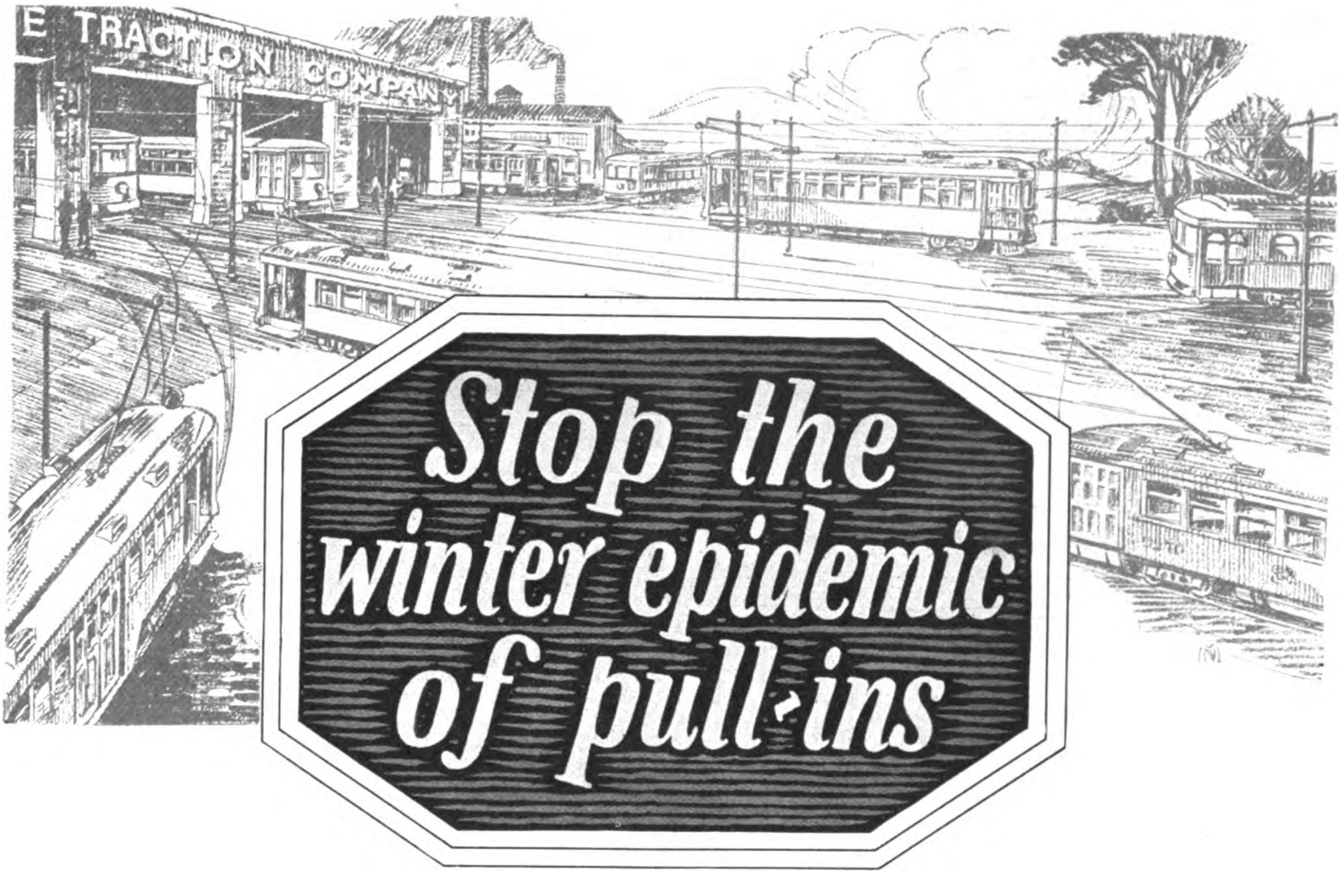
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Stop the winter epidemic of pull-ins

IN cold weather, operating conditions are so much more severe that proper lubrication of your rolling stock becomes doubly important.

Proper winter lubrication is accomplished easily if you use oils and greases which retain their lubricating qualities in cold weather. Lubricants which have the correct body (viscosity) to lubricate properly in warm weather, thicken or congeal in cold weather. They do not flow easily and therefore do not reach all of the parts requiring lubrication. Summer gear grease, particularly, may become so thick that the amount of power needed to move the cars often causes fuses to blow.

Standard Motor Journal Oil
and
Standard Winter Gear Grease

as well as the other Standard Winter Lubricants, such as curve grease and compressor oils, have been developed by the Standard Oil Company (Indiana) to give the proper cold weather lubrication. By using them on your rolling stock, you will prevent the usual winter epidemic of breakdowns and pull-ins.

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For additional information address our nearest branch office, or write direct to

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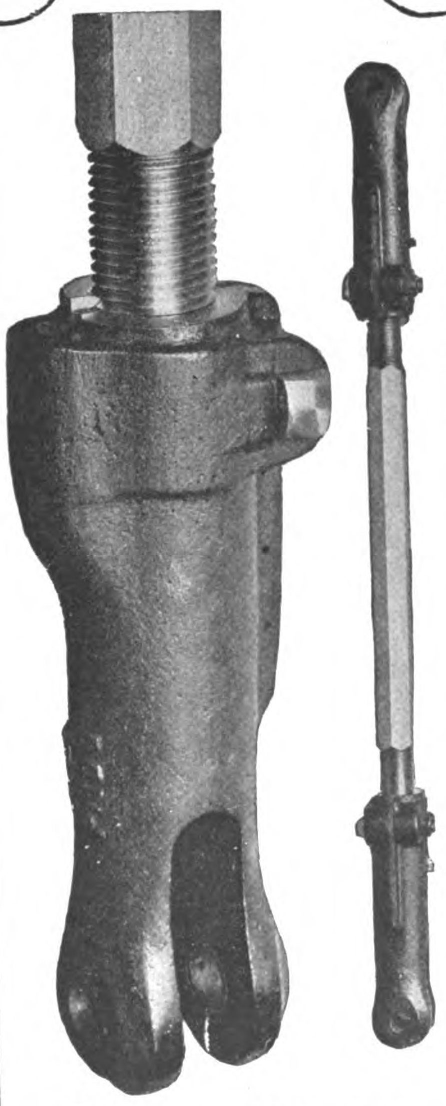
910 S. Michigan Avenue CHICAGO, ILLINOIS



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More than that—the old style jam-nut idea has been scrapped, and an efficient spring-equipped split-clamp principle has been substituted. Now it only takes a pocket-wrench and a moment's time to make an adjustment, and tighten it up *to stay*.

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- Spring Posts
- Bolster and Transom Chafing Plates
- McArthur Turnbuckles
- Manganese Brake Heads
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J. H. Denton, 1328 Broadway, New York City, N. Y.
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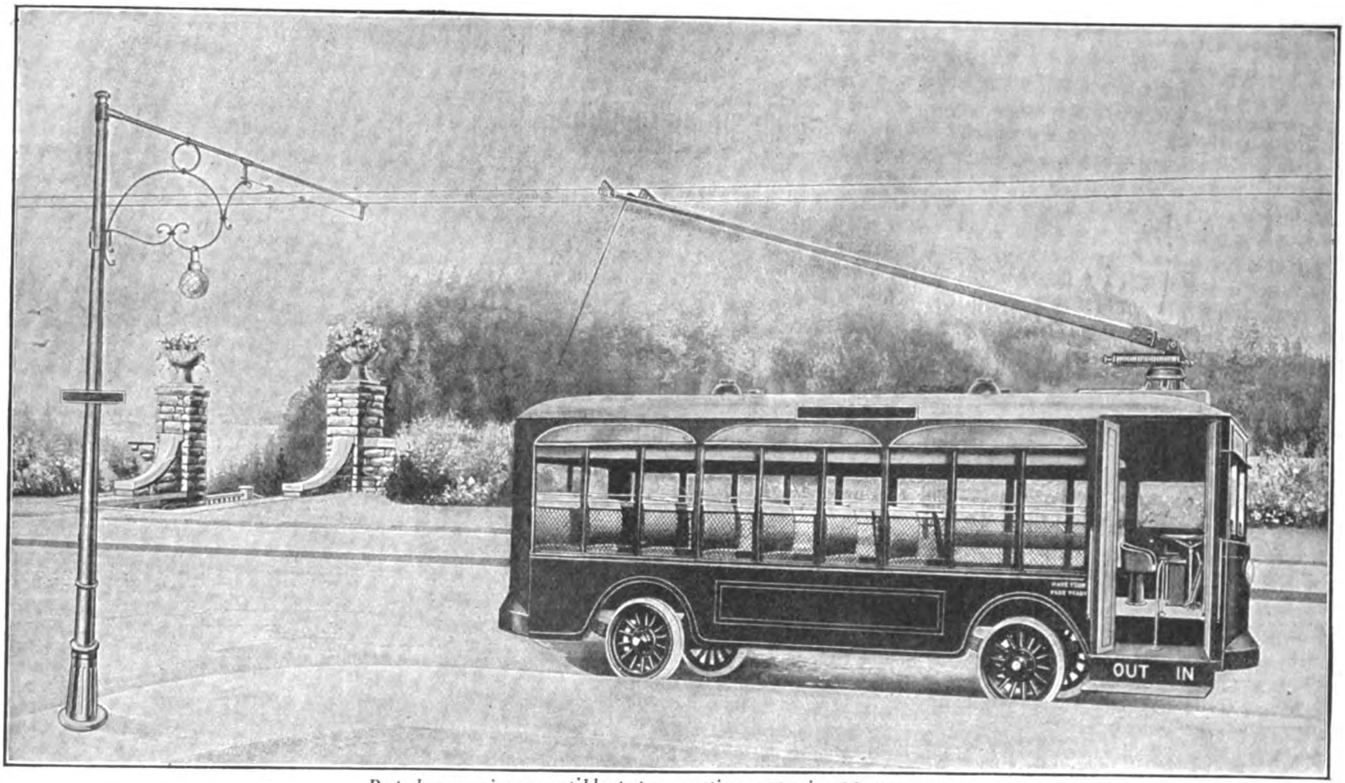

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4-wheel drive
100 per cent traction
20-25 m.p.h. speed
Rapid acceleration

Equipped with brakes on all four wheels, the vehicle is at all times under the absolute control of the driver.

For Lowest operating expenses

Approximately 18 cents per car mile operates a 35-passenger Berg Trackless Trolley. What other transportation unit can approach this low figure? Ideal for replacing non-paying street railway lines.

Current consumption lowest known.
Approximately 1 K.W. per car mile.
One-man operation.

Our concentric gear unit drive eliminates all differential gearings, universal joints, etc. DRIVING GEARS ARE GUARANTEED FOR TWO YEARS.

Our 35 passenger chassis weighs only 7100 pounds including all electrical equipment.

Our illustrated circulars give full details, including an analysis of actual operating expenses.

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Either single pole sliding contact collector or double pole with trolley wheel collector using standard line material.

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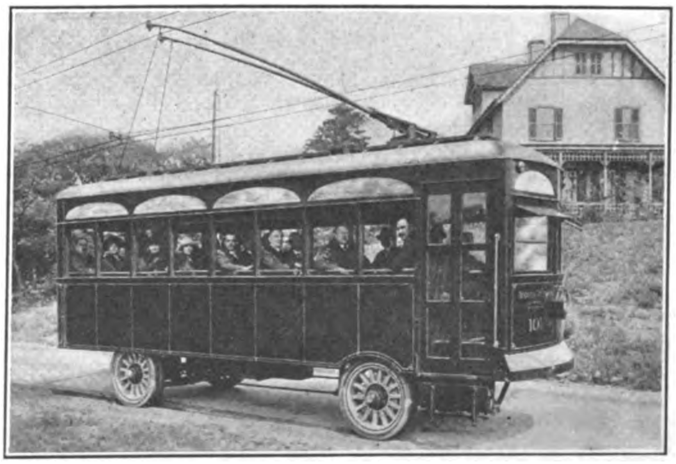

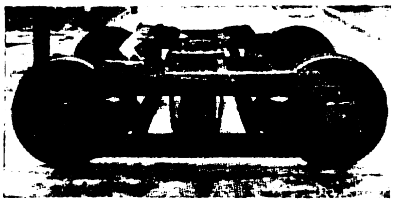

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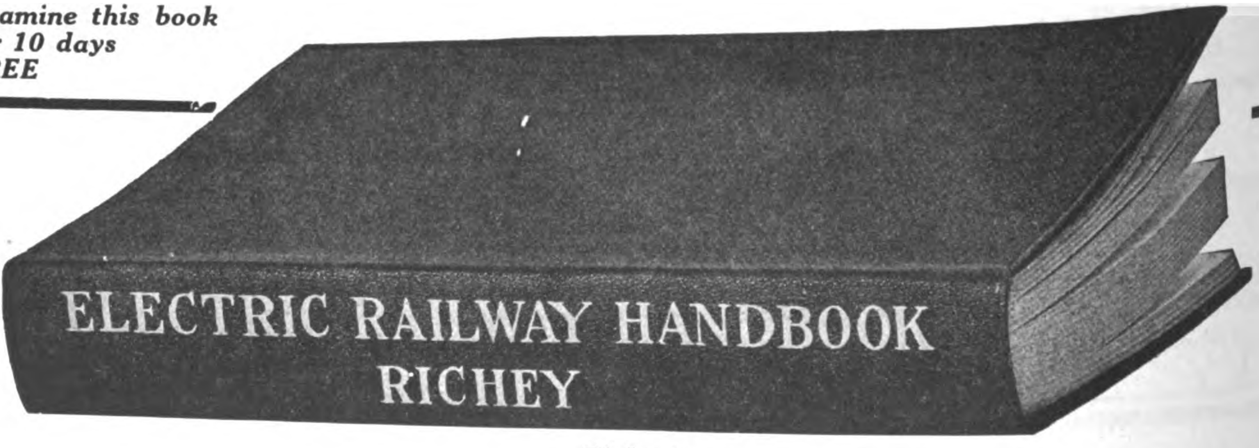

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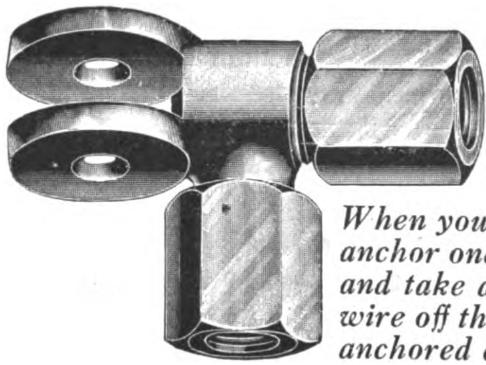

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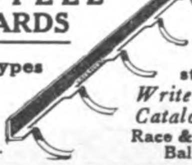

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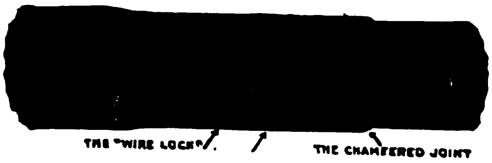

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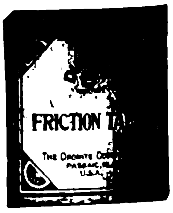

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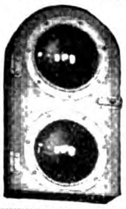

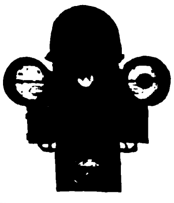

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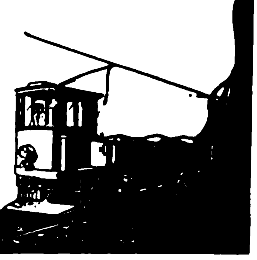

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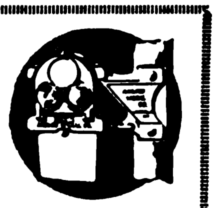

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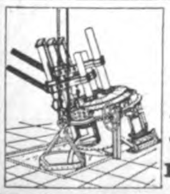

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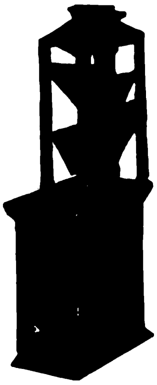
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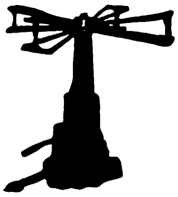
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PEREY TURNSTILES or PASSIMETERS
Use them in your Prepayment Areas and Street Cars
Perey Manufacturing Co., Inc.
30 Church Street, New York City

HALE-KILBURN
CAR SEATS
For Every Class of Service
General Offices and Works: Philadelphia
Offices: New York, Chicago, St. Louis, Washington, San Francisco

PS HEATERS
Car Heating and Ventilation
are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.
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are especially well adapted for use in one-man cars, either for city or interurban service.

The operation is quick and snappy. Each fare is clearly indicated and a correct printed record made of it.

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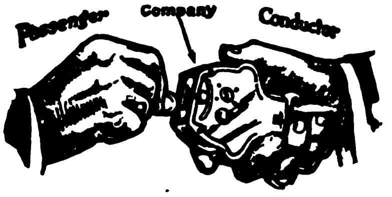

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No. 478E
GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

STOP
"OSKELITE"
The Stop Light for street cars. Operates from brake system. Details on request
The Oskel Equipment Co.
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The Most Successful Men in the Electric Railway Industry read the
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Every Week

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

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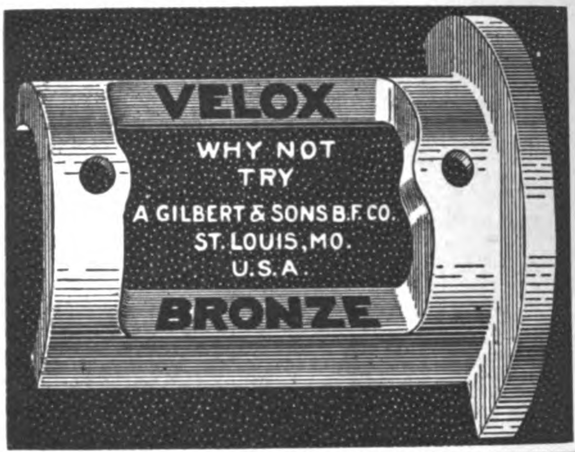
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SHOCKS
have little effect on
AJAX CHECK PLATES
because
these plates are made from
Ajax Perfecto Bronze

The strongest and toughest metal on the market. They will bend before they will break and give longest possible service.

The Ajax Metal Company
Established 1880
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NEW YORK CHICAGO BOSTON CLEVELAND

Waterproofed Trolley Cord

SILVER LAKE A

Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

FOR POSITIVE SATISFACTION ORDER SILVER LAKE

If you are not familiar with the quality you will be surprised at its ENDURANCE and ECONOMY.

Sold by Net Weights and Full Lengths

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Manufacturers of bell, signal and other cords.
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Fort Pitt Spring & Mfg. Co., Springs
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Anderson Slack Adjusters

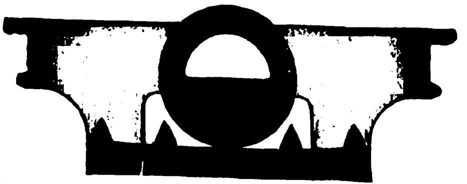
Advertisements for the
Searchlight Section

Can be received at the New York Office of Electric Railway Journal until 10 a. m.

Wednesday

For issue out Saturday

0220



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Trade Mark Reg. U. S. Pat. Off.
Made of extra quality stock firmly braided and smoothly finished.
Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.

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for Electric Railways and Motor Buses.
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An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

E.R.J.

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ROADMASTER wanted for electric road in the East. Must be thoroughly efficient in the handling of material and labor and competent in the maintenance of city and interurban track. State experience, salary expected and when available. P-622, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

SHOP foreman wanted to take charge of car shop on interurban line operating ten cars. State experience and salary expected. P-621, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

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ELECTRIC arc welder, experienced in joint welding, bonding and surface work. Can furnish good references. Open for immediate employment. PW-618, Elec. Ry. Journal, Leader-News Bldg., Cleveland, Ohio.

ELECTRIC freight; position wanted by American man with eight years' experience in all positions. Fully capable of taking charge. Age 45. At liberty Jan. 1st. PW-624, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

ENGINEER of equipment, technical graduate, with several years' experience. PW-623, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

MR. MANAGER, are you in the field for a superintendent of transportation? If so, you should realize that practical experience is an important factor in the successful handling of this department. The writer of this ad has a proven successful record of nineteen years on city, suburban and interurban properties and can furnish high grade refeernces as to character and ability to get results on any property regardless of size or condition of same; at present with large property; personal reasons for making a change. PW-617, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

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WANTED position by master mechanic, 18 years' electric railway maintenance, rebuilding cars, track, trolley and rewinding armatures. Best of reference. PW-620, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

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50 to 100 used 36-in. or 37-in., not less than 34-in. diameter.

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Clinton and Chestnut St., Ft. Wayne, Ind.

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A
"Searchlight"
Ad
Costs Little
and is
Quick Acting

0231

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Cars, Locomotives, Tanks, Steel Piling
Fairbanks-Morse standard gage Gasoline Motor Car; seats 34 people.

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1—Double truck express car with snow plow ends. Operated by air. Brill truck. Complete equipment overhauled.

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FOR SALE

320 LEWIS & FOWLER
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FS-626, Electric Railway Journal
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All in first class condition.
Will be sold at attractive prices.

FS-625, Electric Railway Journal
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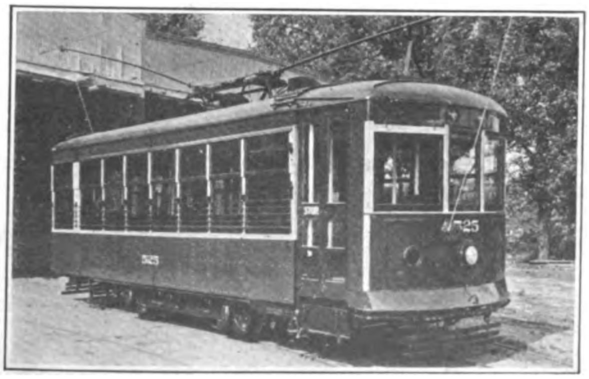
Used One-Man Birney Safety Cars



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Operated about 40,000 miles or less than 2 years. Excellent condition. Write or wire for complete specifications and prices. Only a limited number remaining.

F. B. CUTTER COMPANY
50 Church St., New York City, N. Y.

Steam & Electrical Machinery

Cars and Equipment

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

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Ingersoll-Rand Co.

Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Elec. Service Supplies Co.

Automatic Return Switch Stands
Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

Axles
Bemis Car Truck Co.
St. Louis Car Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Westinghouse E. & M. Co.

Babbitt Metal
Ajax Metal Co.

Badges and Buttons
Elec. Service Supplies Co.
International Register Co., The

Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
General Electric Co.
Gilbert & Sons B. F. Co., A.
St. Louis Car Co.
Westinghouse E. & M. Co.

Bearings, Center and Boiler Side
Baldwin Locomotive Works
Stucki Co., A.

Bells and Gongs
Brill Co., The J. G.
Consolidated Car Heati'g Co.
Elec. Service Supplies Co.
St. Louis Car Co.

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Babcock & Wilcox Co.

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McGraw-Hill Book Co., Inc.

Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.

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Amer. Steel & Wire Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse E. & M. Co.

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Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
National Ry. Appliance Co
Westinghouse Tr. Br. Co.

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Amer. Br. Shoe & Fdy. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

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Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
National Brake Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
U. S. Graphite Co.
Westinghouse E. & M. Co.

Brushes, Graphite
U. S. Graphite Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.

Brushes, Wire, Pneumatic
Ingersoll-Rand Co.

Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.

Cables. (See Wires and Cables.)

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Irvington Varnish & Ins. Co.

Carbon Brushes (See Brushes, Carbon)

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Differential Steel Car Co.
St. Louis Car Co.

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Elec. Service Supplies Co.

Car Panel Safety Switches
Consolidated Car Heati'g Co.
Westinghouse E. & M. Co.

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Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

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St. Louis Car Co.

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Cutter Co., F. B.
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Transit Equipment Co.

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General Electric Co.

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Fahnestock Elect. Co.

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Bemis Car Truck Co.
St. Louis Car Co.

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Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

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Archbold-Brady Co.

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Cleveland Fare Box Co.

Circuit-Breakers
General Electric Co.
Westinghouse E. & M. Co.

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Anderson Mfg. Co., A. & J. M.
Dossert & Co.
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

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Brill Co., The J. G.
St. Louis Car Co.

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General Electric Co.

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Elec. Service Supplies Co.

Coils Armature and Field
General Electric Co.
Westinghouse E. & M. Co.

Coils, Choke and Kicking
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General Electric Co.
Westinghouse E. & M. Co.

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Cleveland Fare Box Co.
Intern'l Register Co.

Coin Sorting Machines
Cleveland Fare Box Co.

Coin Wrappers
Cleveland Fare Box Co.

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Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Commutator Truing Devices
General Electric Co.

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General Electric Co.
Westinghouse E. & M. Co.

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Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.

Compressors, Air Portable
Ingersoll-Rand Co.

Condensers
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General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

Condenser Papers
Irvington Varnish & Ins. Co.

Connectors, Solderless
Dossert & Co.
Westinghouse E. & M. Co.

Connectors, Trailer Car
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
Ohio Brass Co.

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Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

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Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.

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General Electric Co.
Westinghouse E. & M. Co.

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Anaconda Copper Mining Co.

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Brill Co., The J. G.
Elec. Service Supplies Co.
Internat'l Register Co., The
Roebling's Sons Co., John A.
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Samson Cordage Works
Silver Lake Co.

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Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.

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Allis-Chalmers Mfg. Co.

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossing, Frog & Switch
Ramapo Ajax Corp.
Wharton, Jr., & Co., Wm.

Crossing, Manganese
Ramapo Ajax Corp.

Crossings
Ramapo Ajax Corp.

Crossings, Track (See Track, Special Work)

Crossings, Trolley
Ohio Brass Co.

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Brill Co., The J. G.
Elec. Service Supplies Co.
Morton Mfg. Co.
St. Louis Car Co.

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Elec. Equipment Co.
Toledo & Indiana R.R. Co.
Transit Equip. Co.
Zelnicker Supply Co., Walter A.

Derailing Devices (See also Track Work)

Derailing Switches
Ramapo Ajax Corp.

Destination Signs
Elec. Service Supplies Co

Detective Service
Wish-Service, P. Edward

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General Electric Co.
Hale & Kilburn Co.
St. Louis Car Co.

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Consolidated Car Heati'g Co.
General Electric Co.
Nat'l Pneumatic Co., Inc.

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Nat'l Pneumatic Co., Inc.
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Drills, Track
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Roebling's Sons & Co., J. A.

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Railway Track-work Co.

Electrodes, Steel
Railway Track-work Co.

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Beckwith-Chandler Co.

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Arnold Co., The
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Bibbins, J. Rowland
Buchanan & Lay Corp.
Day & Zimmerman, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelly Cooke & Co.
Ong, Joe R.
Parsons, Klapp, Brinkerhoff & Douglas
Richey, Albert S.
Sanderson & Porter
Sangster & Co., A.
Stevens & Wood
Stone & Webster
White Eng. Corp., The J. G.
Wortham, Edwin

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Consolidated Car Fender Co.
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St. Louis Car Co.

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Godwin Co., Inc., W. S.

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Ramapo Ajax Corp.

Frogs, Track (See Track Work)

Frogs, Trolley
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Ohio Brass Co.

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Anderson Mfg. Co., A.&J.M.
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Gold Car Heat. & Ltg. Co.
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Smith Heater Co., Peter

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CORRECT IT
USE LE CARBONE CARBON BRUSHES

They talk for themselves

COST MORE PER BRUSH
COST LESS PER CAR MILE

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Reduce track tamping and maintenance costs.

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THORNTON

The trolley wheel with the high mileage side bearing

Thornton Wheels with Thornton side bearings are unusually long-lived, require less lubrication, and less maintenance. They are free from vibration and noiseless. No bushings. *Investigate them.*

Bearings make fifty thousand or more miles

Send for descriptive circular

Thornton Trolley Wheel Co.,
Incorporated
Ashland, Kentucky

TULC
A LUBRICANT

We make a specialty of

ELECTRIC RAILWAY LUBRICATION

We solicit a test of TULC on your equipment

The Universal Lubricating Co.
Cleveland, Ohio

Tool Steel Face as hard here as on the very surface (This is one of the great differences between tool steel and case-hardening methods)
Toughened Center

Cincinnati "Tool Steel" gears outlast
8 to 10 Untreated
and
are much stronger

The Tool Steel
Gear & Pinion Co.
CINCINNATI, O.

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Lamps, Arc & Incandescent (See also Headlights)
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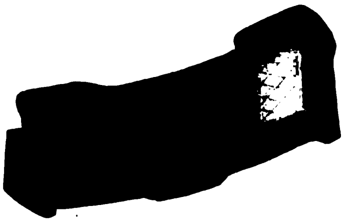

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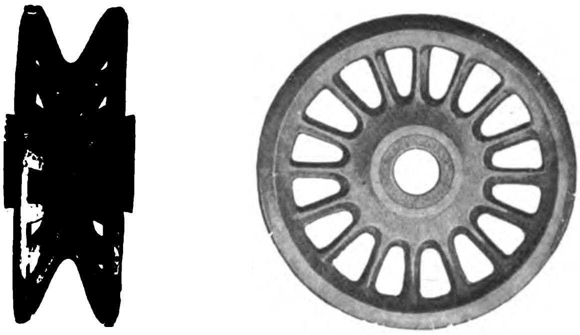

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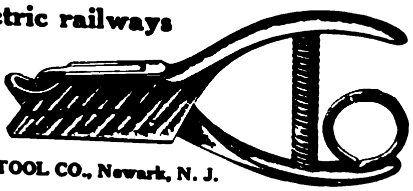

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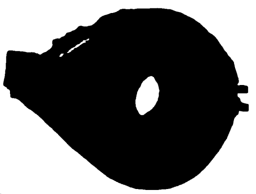

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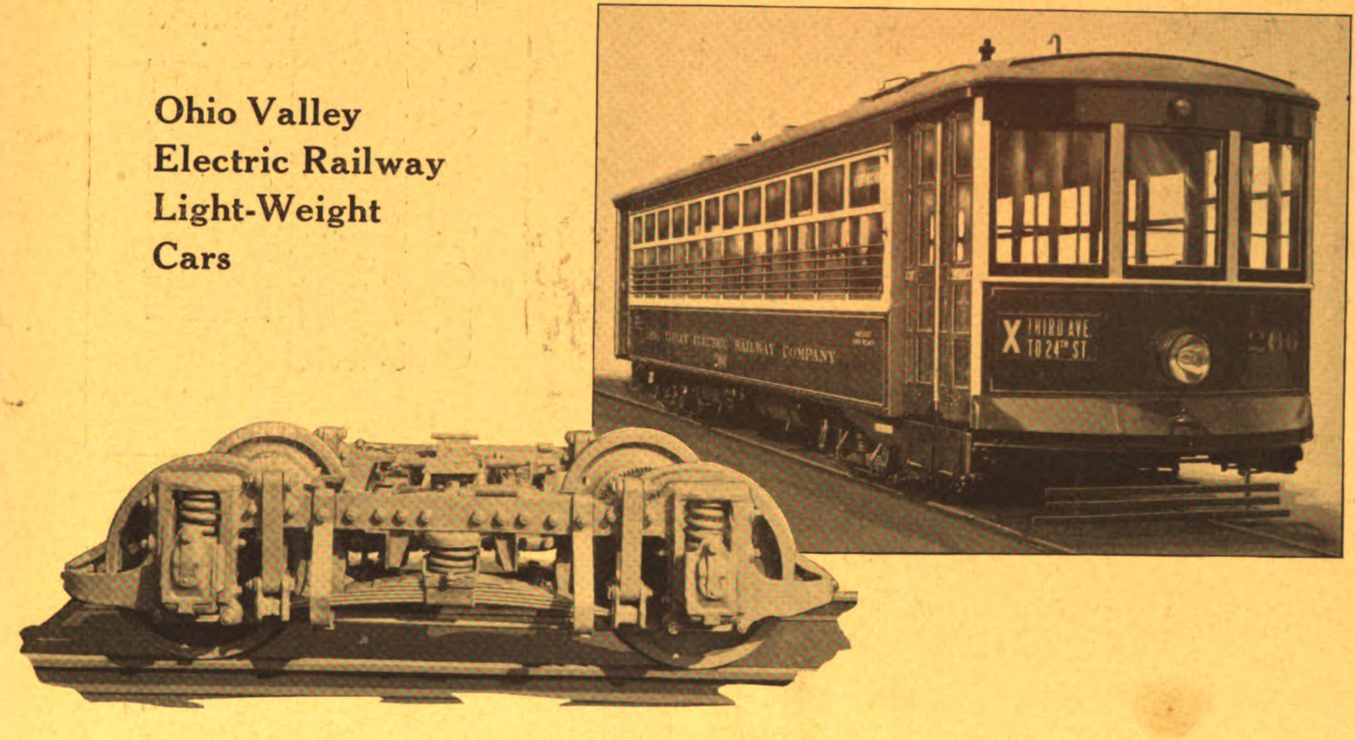

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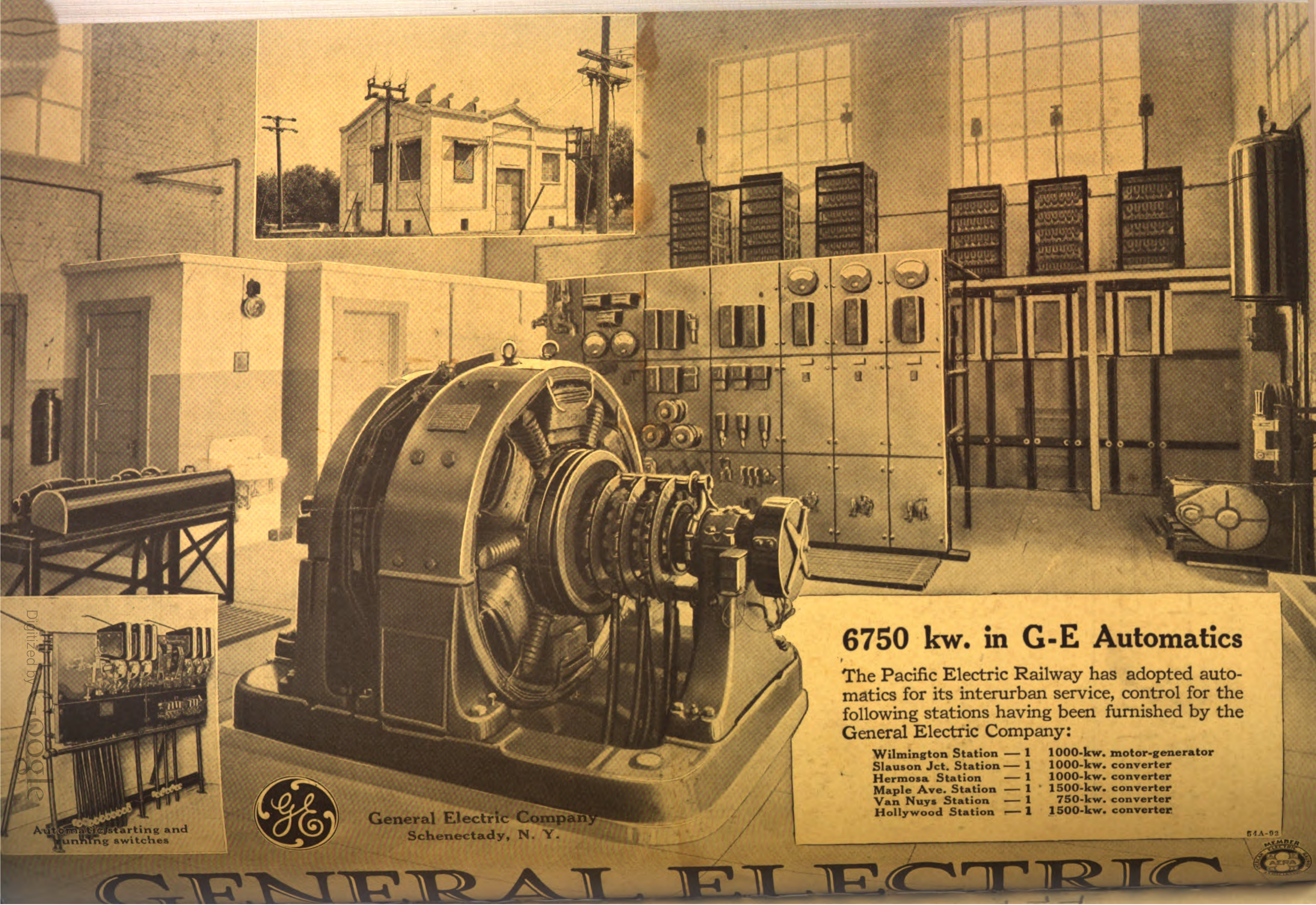

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Experience Shows Light Cars Increase Net of Interurban Lines 927

BY C. T. DEHORE.

Operating results analyzed on several properties over a period of six years show material reduction in operating costs as compared with heavy cars. The light cars take less power and can make schedules better. Revenue increases have followed the improvements in service made possible.

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Friendly relations with newspapers, co-operation with city authorities, prompt settlement of claims, courteous trainmen, clean and freshly painted cars and other means have been used effectively in El Paso.

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BY MAURICE E. REAGAN.

A combination of automatic substation and special automatic feeder operation with supervisory control insures continuity of service on Cleveland Railway lines. Short circuit is burned off, without shutting down the section, by connecting several feeders in the shorted line through resistance.

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The "Journal" Brought Him Back

"PERMIT me to say that your JOURNAL is great stuff. I would hate to do without it, and when my copy gets sidetracked at the main office, as it does occasionally, there is a howl put up by the undersigned that would do credit to the zoo at feeding time. I tried to get away from the railway game a year or so ago, and let my subscription lapse. But shortly afterward I renewed the subscription and that settled things for me, as I couldn't stand the strain and had to get back in the railway business. I can assure you now that you have a devoted reader here, and I feel that I get my money's worth in information and pleasure."

Here is a man who left the field, and wanted the ELECTRIC RAILWAY JOURNAL for light reading! And the call of the industry, as given in the paper, was so strong that he had to heed it and get back into the harness. Need anything more be said?

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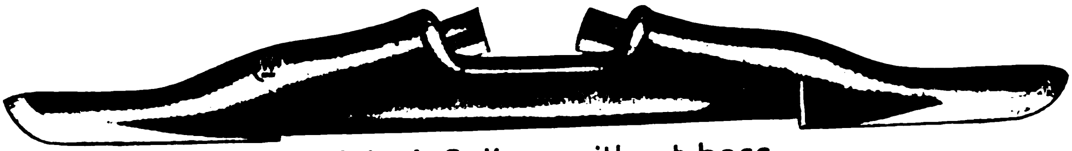
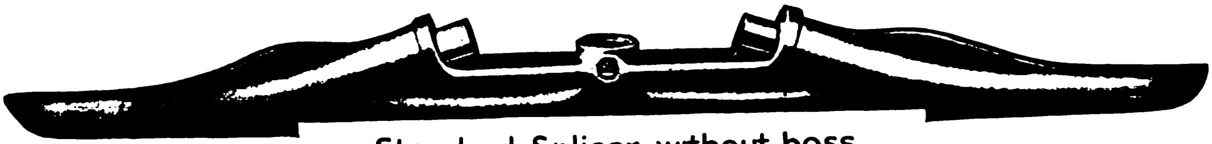
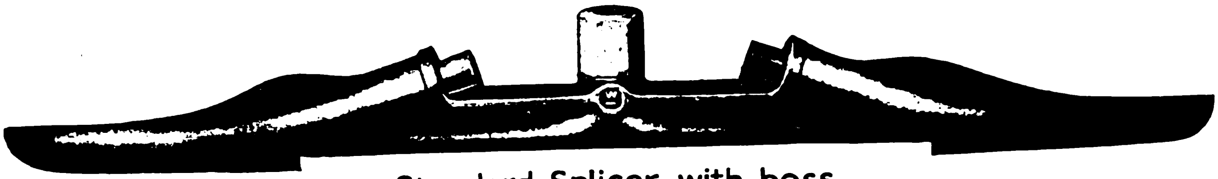


16-inch Splicer, without boss



Standard Splicer, without boss



Standard Splicer, with boss

The Harder The Pull The Tighter The Grip

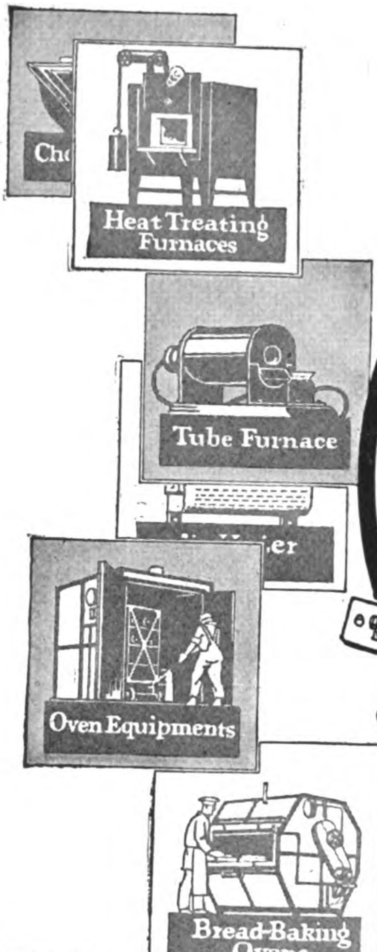
The corrugated, tapered chucks of the **Westinghouse-Cleveland Trolley Wire Splicer,** once slipped over the ends of the wires and hammered into place, have a permanent hold. The splicer is 50 per cent stronger than the strongest trolley wire.

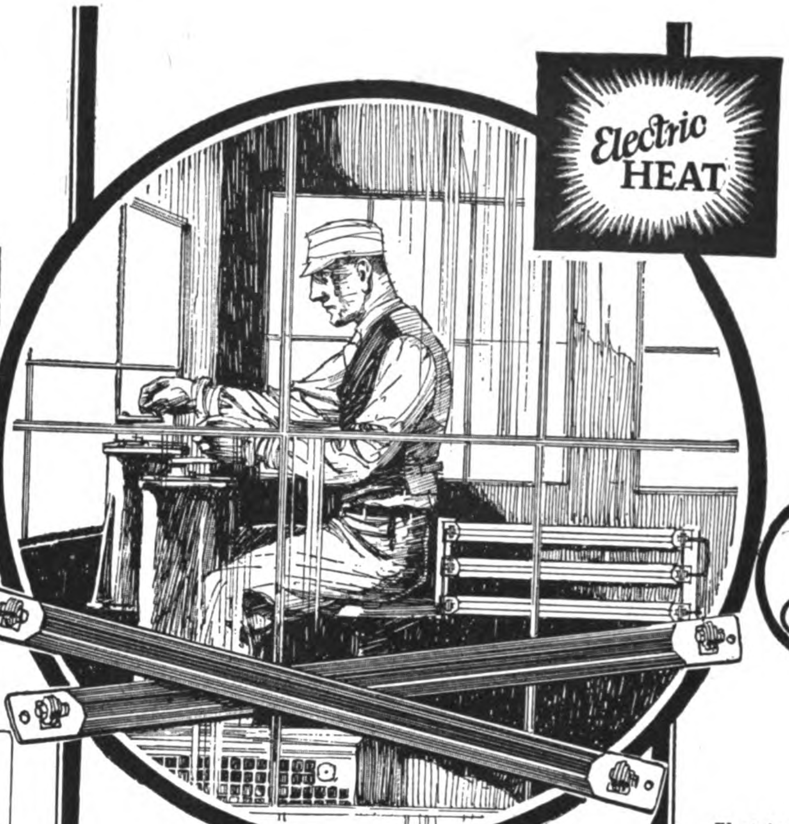
The chucks, made of high-carbon steel, are split and threaded internally, so that the harder the wire pulls the tighter the grip.

The splicer is easily removed to take up slack.

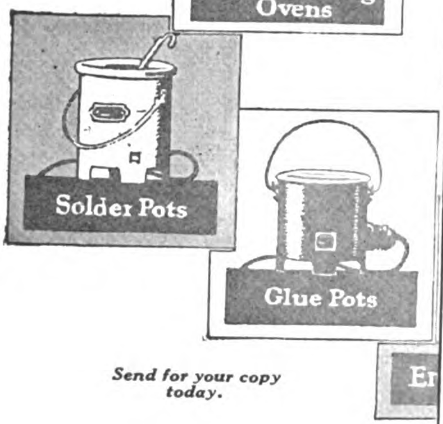
Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.
Sales Offices in All Principal Cities of the United States and Foreign Countries

Westinghouse





Electric heat has many uses. A few of these applications are suggested by the small sketches. Electric heat can be used in your business.



Send for your copy today.

Strips of Electric Heat

Right now is the time to install them; when Jack Frost is beginning to reach out with his cold fingers to nip some of those exposed pipes — when the watchman begins to visit the boiler room frequently because his shanty is so cold — when you begin to realize it is almost cruelty to ask a man to work all day in a cold crane cab.

Westinghouse electric space heaters save all this inconvenience. They are inexpensive, easy to install, and do not cost much to operate. Let your electrician wire up a couple of space heaters in some of those hard-to-heat places, and see how nicely they take the chill off on a cold morning. No fumes, no dirt, no flames to start a fire. Just turn on the heat when you need it, and turn it off when you are through.

A postal to the nearest Westinghouse office will bring sizes and prices. Better hurry, before cold weather sets in.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of the United States and Foreign Countries
See Your Telephone Directory

Industrial Ovens
Space Heaters

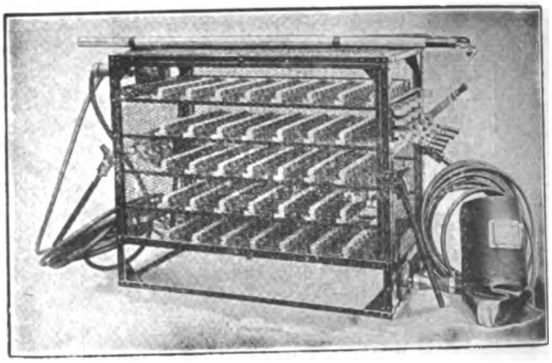
ELECTRIC HEAT

In This Issue—

An occasional publication containing accounts of heating installations of interest to every executive. We shall be glad to put you on the mailing list. Write for a copy today

Westinghouse

Mr. Ong Agrees—



"Ajax" Electric Arc Welder

A traffic survey for the Los Angeles Railway Corporation made by Mr. Joe R. Ong, Piqua, Ohio, as reported in this paper on November 3, agrees with other authorities that:—

"A factor in adequate service is speed"

"People living in an automobile age demand speedy transportation"

"Universal" Rotary Track Grinder

In electric railroading, speed with comfort and safety is possible only on smooth track. Just another reason why the leading electric railway systems of the world buy and use the track grinders and welders shown on this page.

ATLAS RAIL GRINDER

"Atlas" Rail Grinder

Detailed bulletins gladly sent immediately on request

"Hercules" Rail Grinder

Railway Trackwork Co.

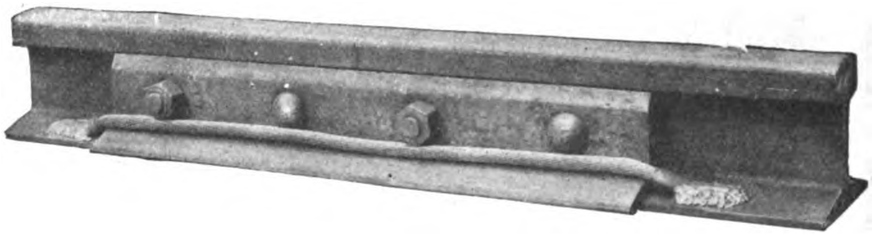
3132-48 East Thompson Street, Philadelphia

AGENTS:

Chester F. Gailor, 30 Church St., New York; Chas. N. Wood Co., Boston; Electrical Engineering & Mfg. Co., Pittsburgh; Atlas Railway Supply Co., Chicago; J. H Doerr, Los Angeles; Equipment & Engineering Co., London.

"Reciprocating" Track Grinder

The AW-8 Bond, shown above, for arc welding to the ball of the rail and the AW-7, at the right, for arc welding to the base of the rail are two popular O-B bonds.



Leaving the Back Door Wide Open with the Front Door Carefully Bolted

Neglect of the bonding of the rails is like leaving the back door wide open after the front part of the house has been carefully bolted against burglars. Much care and attention is given to the overhead—insulation of supports and hangers and attachment of ears, frogs, etc.

The rail circuit has just as much of a current carrying function as the trolley wire. The bonding should be just as carefully completed—it should be put on a par with the overhead.

O-B Arc Weld Bonds have been developed with the idea of giving the best possible in the way of material that will amply carry the current and persist after years of use. Design of terminals is to make welding as simple as possible and more certain.

Specially stranded copper cable of commercially pure annealed copper wires bought on rigid specifications—

Deep drawing stamping steel to the exact thickness and of ideal ductility for welding—

Copper sleeving between bond cable and terminals that dampens the effect of vibration at the point of entry of the cable into the terminal—

Terminal and cable welded together with a process that precludes coating of terminal with either copper or carbon—

These things—that do not always show on the surface are values that are bound to improve welding—we believe they account for the exceptional record of O-B Arc Weld Bonds.

Let us help you institute a trial!

The smaller welder for 250 volts and the larger one for 500-600 volts were made to order for O-B Bonds and are good for any general repair job. Furnished complete with the necessary accessories. Write for complete description.

The Ohio B Brass Co.
Mansfield, Ohio, U.S.A.

New York Philadelphia Pittsburgh Charleston, W. Va. Chicago Los Angeles San Francisco Paris, France
Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators

Illinois Traction Company

Public Service Railway
of New Jersey

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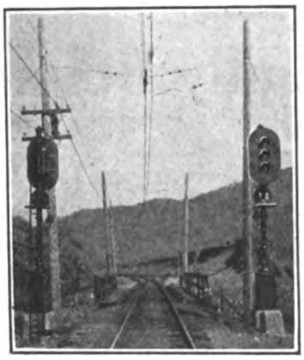
Company



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St. Paul Railway

Washington, Baltimore &
Annapolis Electric Railroad

Kansas City, Clay County
& St. Joseph Railway

Public Confidence

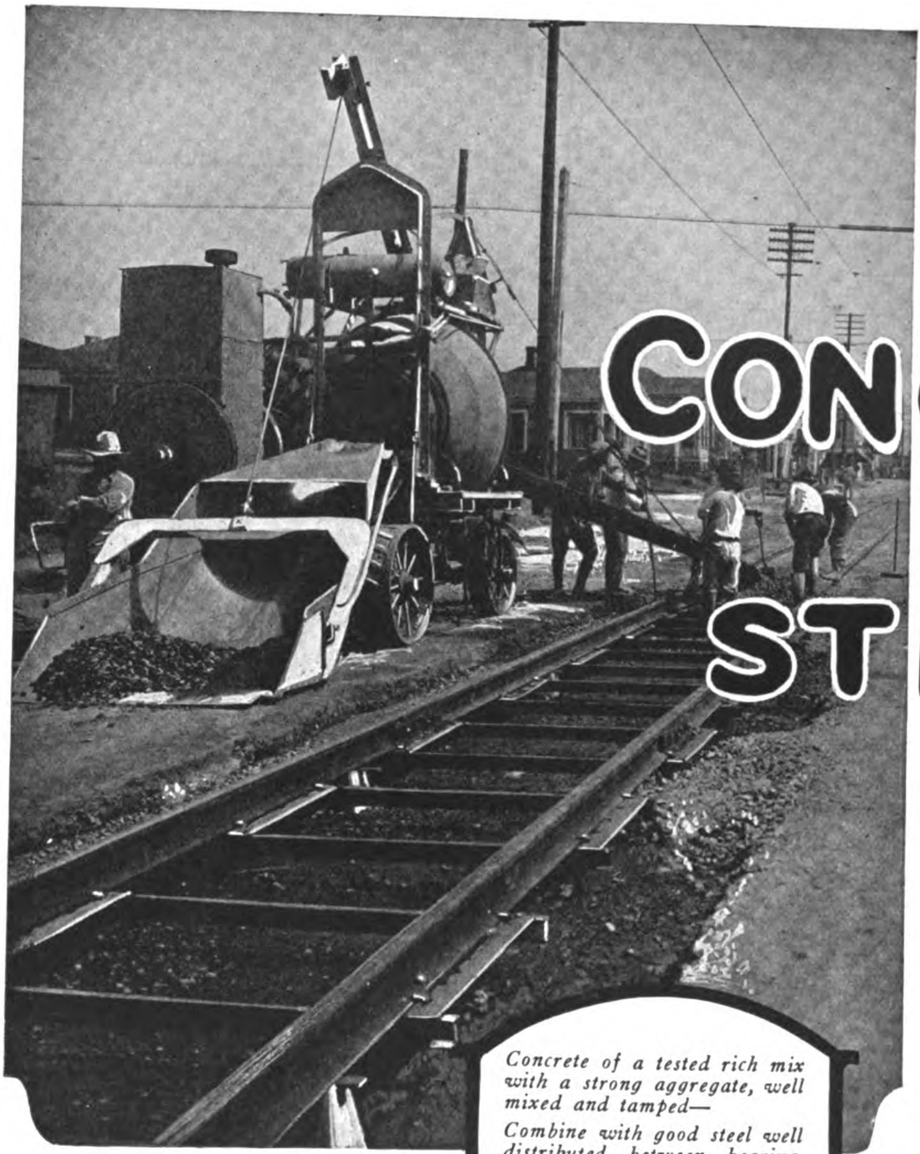
IS ASSURED to Railways equipped with Union Automatic Block Signaling Systems. Return on the investment is secured by the direct and indirect savings produced.

To be Complete—Safe, a signaling system must be based upon the sound principles of the Continuous Track Circuit, or in other words, a means must be provided whereby each car or train is responsible by its mere presence *anywhere* in the block or spacing section to *continuously* maintain one or more opposing stop signals in front of it as well as a stop signal behind it.

Local conditions govern each installation. Let one of our Engineers show you the benefits which Signals will produce for your Railway.

Union Switch & Signal Co.
SWISSVALE, PA.

TRADE US MARK



CONCRETE

STEEL

Concrete of a tested rich mix with a strong aggregate, well mixed and tamped—

Combine with good steel well distributed between bearing, reinforcement and tie members. These are the logical permanent materials for the foundation of the best paved track.

There is nothing in such construction to absorb water; to start cracks nor to rot and undermine the rail and joints.

When you hear that such construction is lower in first cost than wood tie construction, the rumor deserves intensive investigation.

Write, or wire, for prices definite shipping date, guaranteed freight rate, and folder on "Costs, Methods and Best Practice in Steel Tie Track Construction."

All Permanent Materials Make Long Lived Track

The **International**
Steel **Tie Company**
Cleveland, Ohio

Canadian Representatives
Sarnia **Bridge Company,**
Limited
Sarnia, Ontario

Steel Twin Tie Track

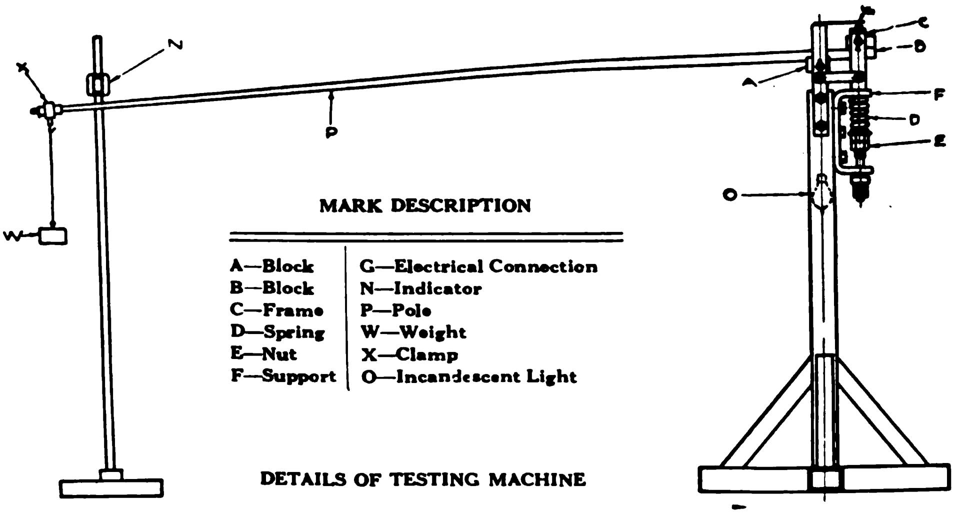
The Test That Tells

for your

TROLLEY POLES

A TEST, approximating service conditions, is applied to every standard pole before it leaves the mill. This test is made on an improved testing machine in which the trolley pole is treated as a cantilever. This machine infallibly indicates the presence of a permanent "set" in the material, or any other imperfections which would impair the usefulness of a pole.

The base of the pole under test is set horizontally in the grips of the machine, after which a deflection gauge is set, corresponding to the height, from the floor line, of the free end of the pole under no load.



MARK DESCRIPTION

A—Block	G—Electrical Connection
B—Block	N—Indicator
C—Frame	P—Pole
D—Spring	W—Weight
E—Nut	X—Clamp
F—Support	O—Incandescent Light

DETAILS OF TESTING MACHINE

The proper weight for the pole being tested is then hung on the free end of the pole, and an adjustable electrical contact is set so that the tension on a spring in the testing machine, when the pole is so loaded, is sufficient to close the current of an incandescent lamp. After this adjustment is made, the weight is removed and the return of the trolley pole is checked with the deflection gauge.

After the first pole of a particular lot has been so tested and the proper adjustment determined for closing the electric current, the remaining poles of the lot are tested by placing them in the machine one at a time, the operator deflecting each pole sufficiently to cause the lamp to light; after which the pole is tested for permanent set or deflection.

Any pole that does not return to its original position after deflection is rejected.

This test is your assurance that

"SHELBY"

Trolley Poles will meet your severest conditions in a dependable manner.

Ask for Booklet

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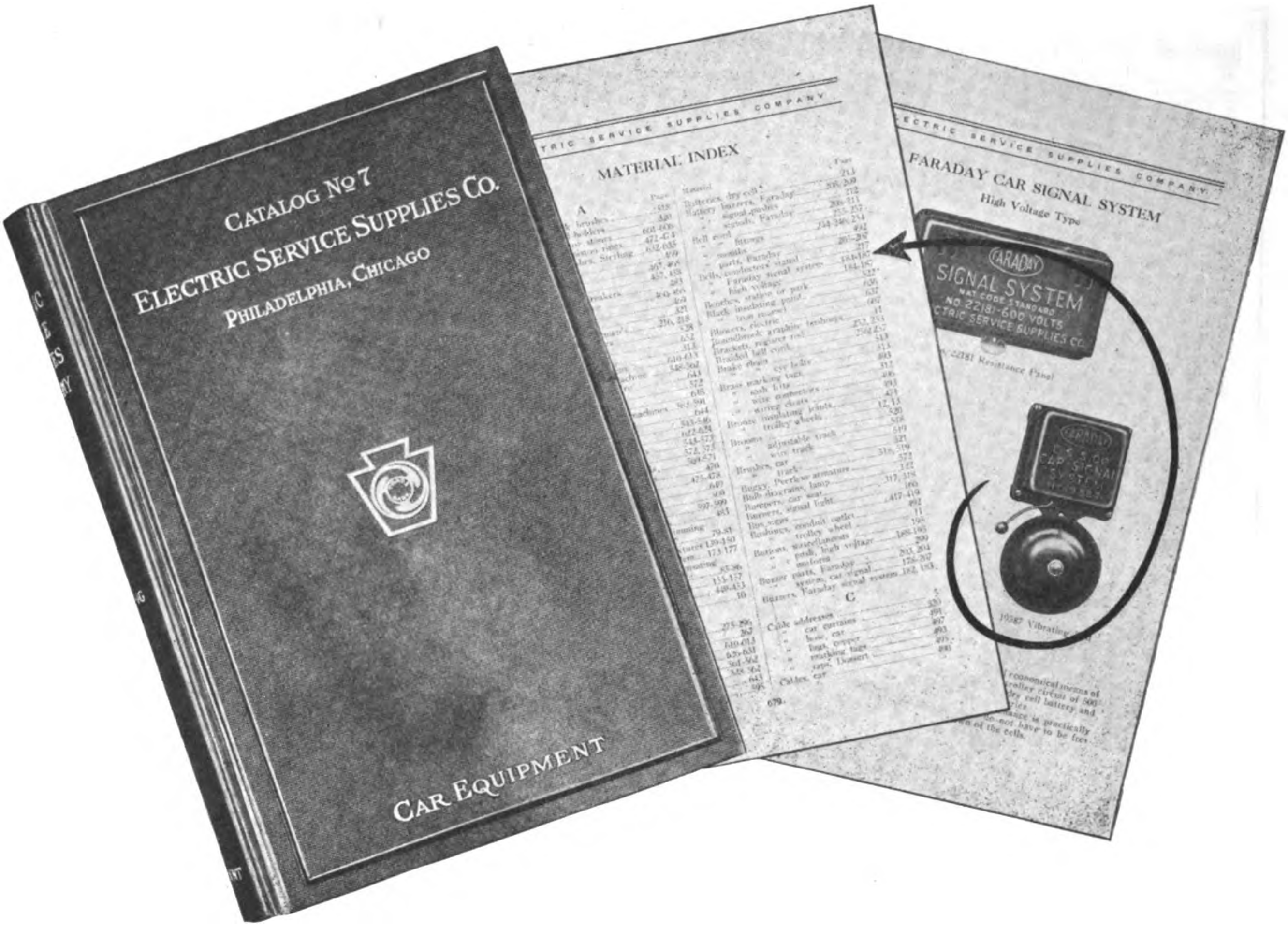
Catalog No 7
Electric Service Supplies Co.
Philadelphia, Chicago
Car Equipment
Electric Service Supplies Company
Material Index
Faraday Car Signal System
High Voltage Type
Faraday
Signal System

Faraday Signal Systems

One item from Catalog No. 7

There are hundreds of others, covering almost every conceivable kind of car and shop equipment.

Nine pages of itemized index alone, in this 688-page book.

Take Faraday Car Signal Systems as a single example. Every kind of buzzer, button and bell, with spare parts and optional designs is illustrated, described and listed. What could be more useful to the equipment engineer, superintendent, master mechanic, or purchasing agent than such a reference book?

If you have not received a copy send for yours

ELECTRIC SERVICE SUPPLIES CO.

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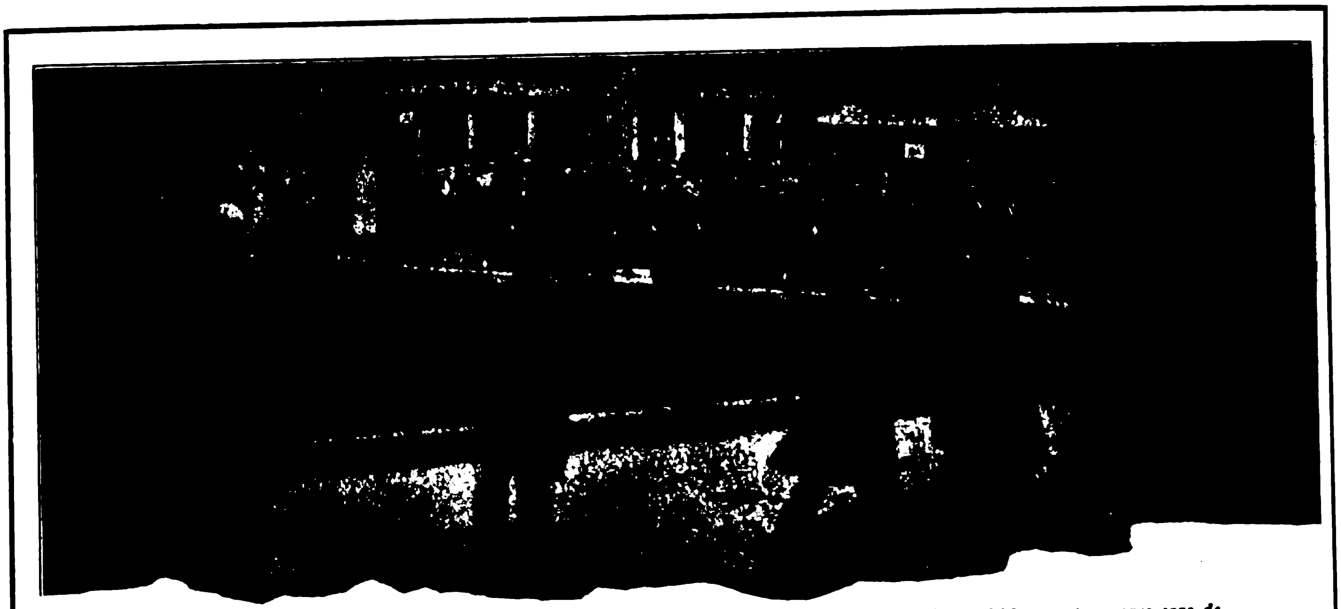
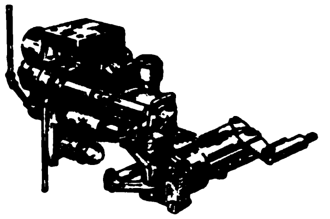


When the first of the 200 new type cars was delivered to the Brooklyn City Railroad Company it was placed on exhibition near Brooklyn Borough Hall. Alongside it was shown an old horse-car which saw service in Brooklyn many years ago.



The Variable Load Brake Arrives in Brooklyn

The Westinghouse Variable Load Brake has arrived in Brooklyn with the delivery of the first of the 200 new type cars for the Brooklyn City Railroad Company.

The entire 200 cars, which are of the double-truck, light-weight, one-man, two-man type, will be equipped with the Variable Load Brake and are therefore of more than ordinary interest to all street railway men.

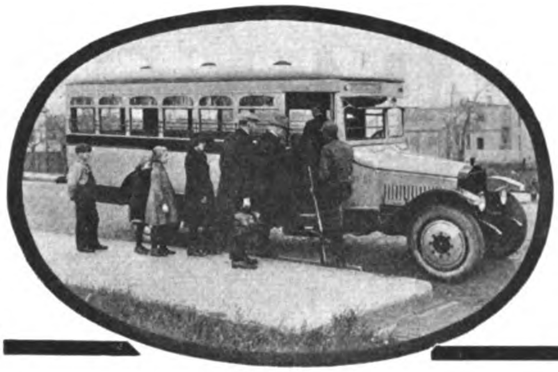
Ask for
Publication
T-2045

The Brooklyn City Railroad Company adopted the Variable Load Brake after a careful study of its traffic problems in order to determine how schedules could be speeded up. With this brake, the new cars will be stopped within the shortest possible distance, with minimum loss of time, and the stopping distance (or time) will NOT increase as the load increases.

The Variable Load Brake is not only safer, but in heavy traffic it is essential also as a time-saver and a revenue-builder.

Westinghouse Traction Brake Co.
General Office and Works: Wilmerding, Pa.

WESTINGHOUSE TRACTION BRAKES



1000

—*stops and starts a day!*

BANG! Slam! Doors opening and closing at eight or ten stops every mile! Did you ever pause to realize that the car or bus in average city service makes more than a thousand stops and starts per day?

Only equipment made by experts and proved by the test of time, is good enough to use in such strenuous service.

Perfect operation, efficiency and minimum maintenance are the substantial benefits of using National Pneumatic Equipment.

NATIONAL PNEUMATIC

Door and Step Equipment

Door and Step Control
Door and Step Operating Mechanisms
Motorman's Signal Lights
Safety Interlocking Door Control
Multiple Unit Door Control

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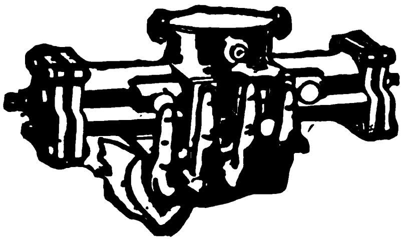

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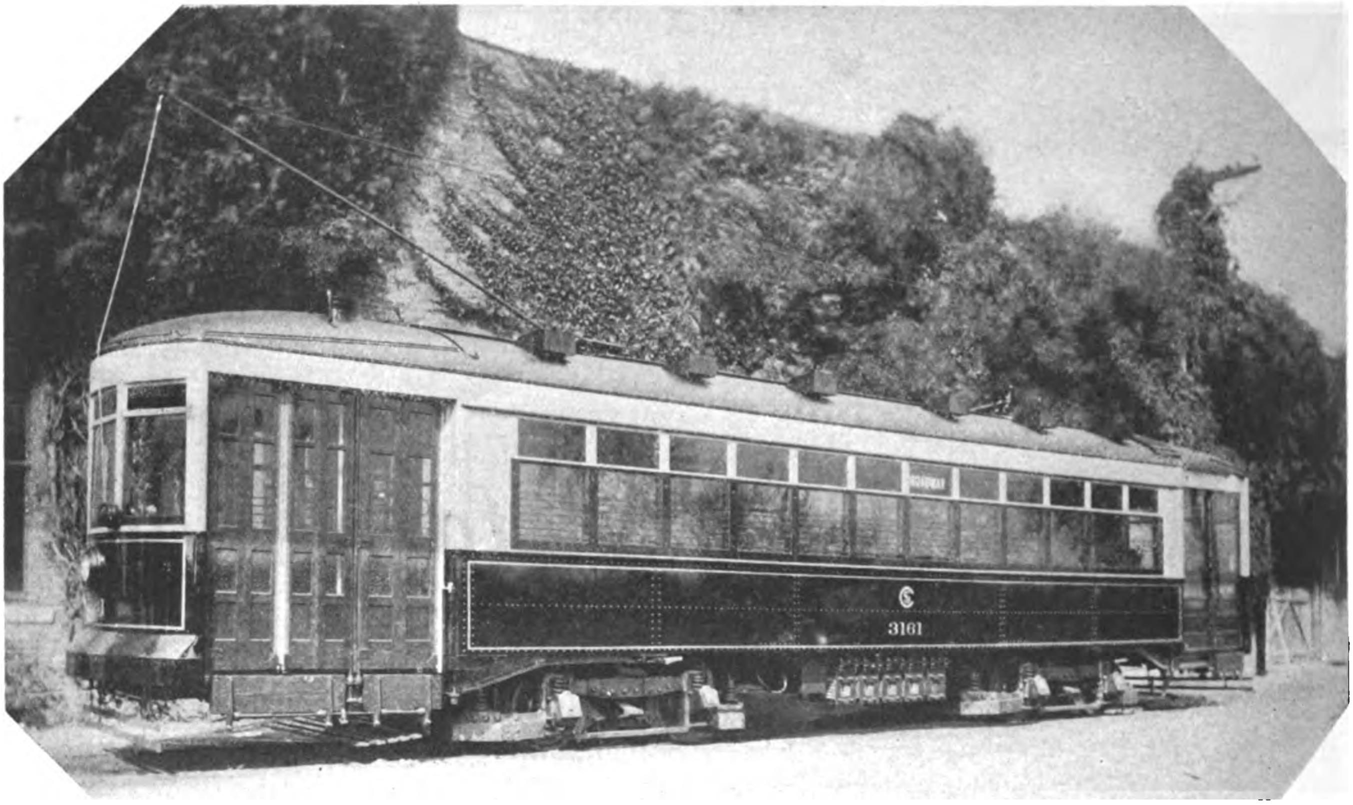

Double-Truck Passenger Cars for Two-Man Operation Built for Chicago Surface Lines

The above shows type of cars built for the Chicago Surface Lines. Succeeding advertisements will feature cars of the following types recently built by us:—

Double-Truck Cars with Multiple Unit Control
Built for the Georgia Railway & Power Co., Atlanta, Ga.

Center Entrance Cars (Peter Witt Type)
Built for the City of Detroit

Light Weight, Double-Truck Cars, One-Man-Two-Man Operation

Built for Des Moines City Railway Co., Des Moines, Iowa

Safety Cars—One-Man Operation, with Double Doors
Built for Gary Street Railway Co., Gary, Indiana

Our engineering department is at your service. We will be pleased to either submit specifications and drawings and to quote prices thereon, or we will submit proposals on specifications furnished.

McGuire-Cummings Manufacturing Co.

General Offices:
111 West Monroe Street, CHICAGO

NEARLY 200 PROPERTIES FULLY EQUIPPED

In 1923
These companies
demonstrated their belief in
ECONOMY METERS

Saving power at the car
Saving labor at the car house

- Eastern Wisconsin Electric Co.
- Eastern Massachusetts St. Ry. (Repeat Order)
- Northwestern Ohio Railway & Power Co.
- Washington & Old Dominion Ry.
- Southern Pennsylvania Trac. Co. (Repeat Order)
- Guadalajara, Mexico
- Olean, Bradford & Salamanca Ry. Co.
- Eastern Texas Elect. Co. (Repeat Order)
- Buffalo & Lake Erie Trac. Co. (Repeat Order)
- West Penn Railways (Repeat)
- Wheeling Traction Co. (Repeat)
- Union Street Ry. New Bedford, Mass. (Repeat)
- Dayton & Western Trac. Co. (Repeat)
- The Milwaukee Electric Railway & Light Co. (Repeat)
- Detroit Municipal Ry. (Repeat)
- Northern Ohio Traction & Light Co.
- Interstate Public Service Co. (Repeat)
- Denver Tramway Co. (Repeat)
- Middlesex & Boston Street Railway Co.
- Plymouth & Brockton Street Ry.
- Public Service Railway Co., New Jersey
- Western Ohio Railway Co. (Repeat)
- Sunbury & Selinsgrove Railway Co.
- United Railways Co. of St. Louis (Repeat)
- Philadelphia Rapid Transit Co. (Repeat)
- Pittsburgh County Railway Co.
- United Traction Co. (Albany, N. Y.)
- Cincinnati, Georgetown & Portsmouth R.R. (Repeat)
- Omaha & Council Bluffs Street Railway Co. (Repeat)
- Chicago Surface Lines
- San Antonio Public Service Co.
- Ohio Valley Railway Co.
- Barcelona, Spain
- Chicago,North Shore,Milwaukee (Repeat)
- Holyoke Street Railway (Repeat)
- Waverly, Sayre and Athens Ry.
- Indiana Service Corp. (Repeat)
- Cincinnati Traction Co. (Repeat)
- San Francisco, Oakland Terminal Ry. Co.

Economy Meters are inducing savings from ½ to ¼ a cent per car mile. It will pay you to investigate whether you are operating one car or three thousand.

Economy Electric Devices Company
L. E. Gould, President.
1592 Old Colony Building, Chicago

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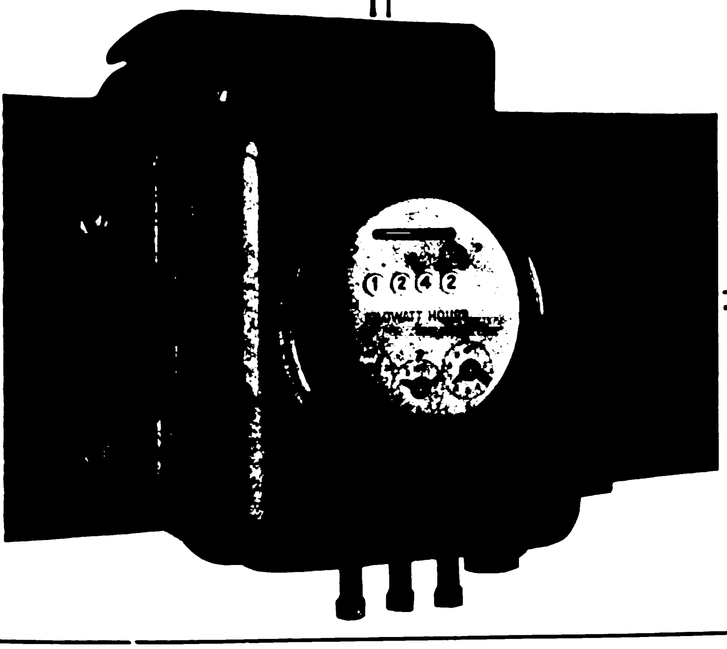
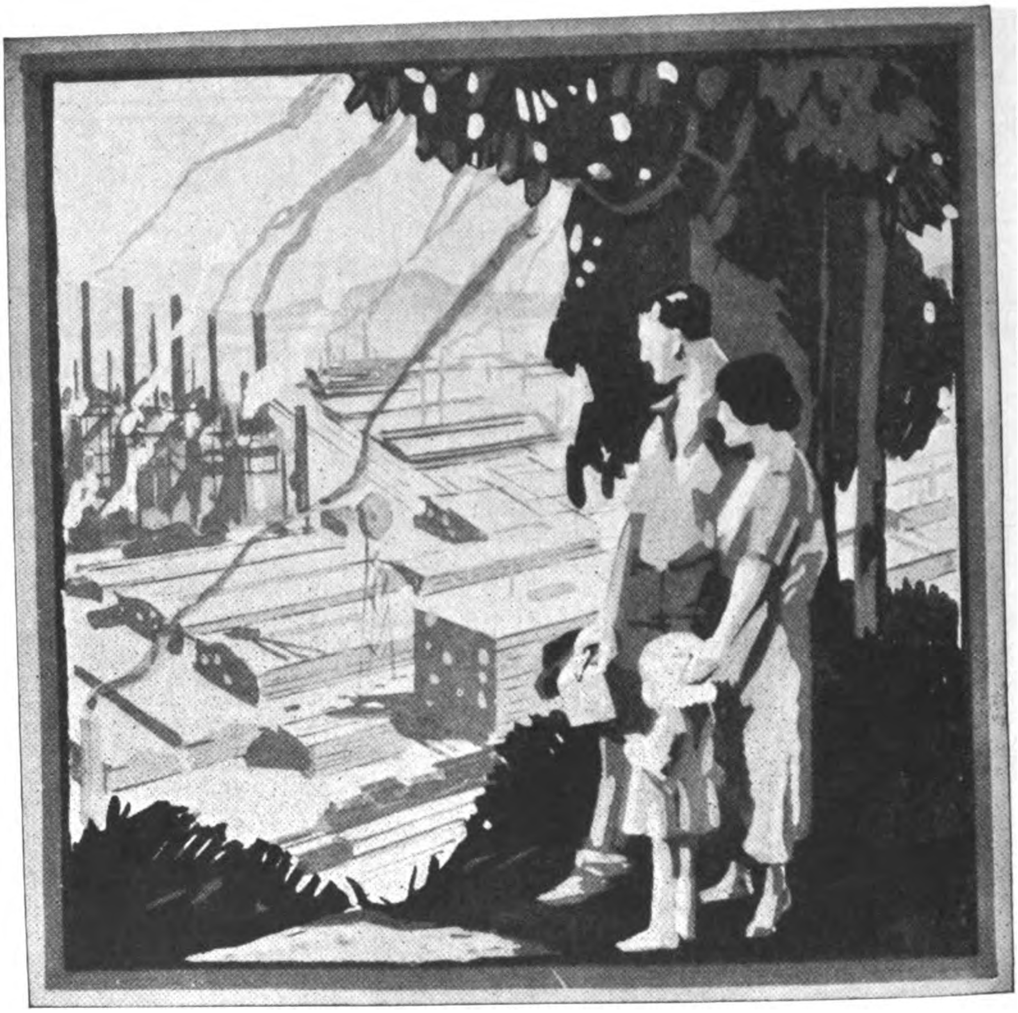
Sangamo Economy Railway Meters
The Air Rectifier

District Agents
Peter Smith Heaters
Wood Fare Boxes
Bemis Boyerized Truck Specialties
Miller Trolley Shoes



METER THE ENERGY
That's What You Want To Save.



FAITH

FAITH has built Empires. Faith has built Industry. Faith is the foundation of our existence.

The workingman strives because he has faith in those who minister to his future. The modern executive provides better working conditions for those under his care because he has faith in the principle of "Good begets Good."

His faith yields a return of faith on the part of his workers manifested to him in the form of their greater endeavor and purpose.

Many of the largest organizations in the business world are bettering working conditions for their employees through Group Insurance. The benefits that have accrued to all concerned have been shown to be permanently lasting.

THE TRAVELERS INSURANCE COMPANY
Hartford

L. F. BUTLER, PRESIDENT

THE TRAVELERS INDEMNITY COMPANY
Connecticut

THE TRAVELERS

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QUALITY-SERVICE-ECONOMY
G O S
GALENA OILS

Electric Railway Lubrication

Turbine Lubrication

The extremely low consumption of oil in this service—practically only that covered by leakage and the small amount due to evaporation and wear—makes the use of the best lubricants obtainable the only logical choice for selection. Good turbine oils will save many times their difference in first cost in the additional service received, over the greatest possible return of which cheap or unsuitable oils are capable.

GALENA TURBINE OILS are positive in service results. Installations on every known type of steam turbines have demonstrated their special suitability to meet the peculiar conditions involved in this class of lubrication. Their ready adaptability to working temperatures and power to maintain a uniformly efficient lubricating film without sludging or breaking down, enables these oils to reduce materially the cost of turbine lubrication.

Of high flash-point, non-emulsifying and free from acid, Galena Turbine Oils have all the characteristics essential to successful results in circulating systems. Manufactured from strictly pure mineral oil of the highest quality produced, their matchless performance in service classifies them as the most durable and efficient lubricants marketed for this use.

"Galena Quality Is Our Bond
and Your Security!"

Galena-Signal Oil Company
New York Franklin, Pa. Chicago
and offices in principal cities

RAILWAY AND MINE HAULAGE MOTORS
FIELD COILS FOR TYPE GE MOTORS
GE
RAILWAY SUPPLIES
GENERAL ELECTRIC COMPANY
SCHENECTADY, N.Y.

The best field coil
is a new field coil

Sometimes it is cheaper and better to renew entirely than to make repairs. Maintaining field coils is a case in point.

Take G-E Coils for instance. They are filled with an asphaltum compound by the vacuum pressure process; the compound so penetrates the winding that it seals the coil against the entrance of moisture, improves its thermal conductivity and greatly increases its capacity.

Our factory facilities are being enlarged to meet the increasing demand.

Your Text
Book
on
Equipment
Standards

General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities

GENERAL ELECTRIC

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review
Published by McGraw-Hill Company, Inc.
HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 62
Number 22

View the Bus in Its Place

WE HEAR a lot about the bus—and perhaps rightly so. Like the faithful colored servant, it is a very helpful adjunct, if kept in its place. And like that servant it may "talk up" out of all proportion to its importance, relative to the master of the situation, the electric railway.

To be specific, the bus in 1922 was 0.09 per cent as important to the general public as the electric railway. It carried nine-hundredths of 1 per cent as many revenue passengers as did the trolley—in figures, 11,852,726 on the bus and 12,665,300,050 on the electric railway—eleven million against twelve billion—according to the Bureau of the Census.

But that was 1922, the bus enthusiast will say. Well suppose we allow a 100 per cent increase in bus passengers carried for the year 1923, which is known to be a very generous allowance. And suppose the railways hauled no more passengers in 1923 than in 1922. On this basis of comparison the bus in 1923 will have carried 0.18 per cent as many passengers as the electric railway—less than two-tenths of 1 per cent.

These figures show clearly the place of the bus in transportation importance. It is a tiny infant as yet, though growing with remarkable rapidity. But what an extravagant statement one makes when he says the day of the trolley has passed.

Insurance Is Good— Fire Prevention Is Better

FIRE insurance is a tremendously important thing for all electric railway companies, and they should be very certain that their properties are adequately protected—a condition, strangely enough, which often does not exist. But even more important than the assurance that the physical property loss will be reimbursed in case of fire, is the need for effort and attention expended in the direction of preventing fires. The fire insurance collected does not reimburse a company for the loss of revenue which occurs during the four months to one year period that may elapse before the property burned (cars, for example) can be replaced; nor does it compensate the public for the loss of service which it must suffer.

This is all by way of emphasis of the necessity for a regular inspection of the fire protection facilities installed on most railway properties and of the general housekeeping conditions over the property. For example, on a recent check-up of the conditions on a street railway system, it was found that only three automatic fire doors worked out of ten tested. A test of the company supplying the watchman service, wherein the regular ring-in at several boxes was skipped, failed to bring any response from the company for over an hour. Various other conditions were found over the property which not only contributed seriously to the fire hazard existing, but would have been cause for a material increase in the insurance rates on various pieces of plant, had they been discovered by the insurance company's inspectors. It is a comparatively simple thing to install fire alarm systems, sprinkler systems, watchman protective service, automatic fire doors, and various other devices for minimizing the danger of fire. It does not take any great amount of managerial ability to get these things installed. But unless the manager supplies the incentive for eternal vigilance in keeping these things in working order they are of little use, and the company might better have saved the investment.

Every railway property should have a periodic, systematic check-up on the fire conditions. Fire prevention is the thing—insurance only for the truly unavoidable fire. Such a policy is always reflected in the rates a company is required to pay.

Transportation Field Needs to Be "Sold" to Faculties

LIKE some investment bankers who recommend today to their clients that electric railway securities should be avoided, the faculties of some of the universities are very lukewarm, if not completely negative, about the opportunity which the transportation field offers for young college trained men. Both classes of men are not keeping up with the progress made in this field in the last three years. The attitude of the bankers merely makes money a little harder to get, but this attitude on the part of faculties tends to deprive the transportation industry of a supply of good personnel for taking over the active positions of the industry in the future. The latter is the more important concern, for with the proper brains in the field, the money problem will take care of itself.

In view of all the advertising that has been given to the troubles of the industry it is rather natural, of course, that people not closely in contact with the everyday developments in the transportation field should at the present time have the idea that the field is not a promising one for the young man to enter. But while this impression is explainable, the industry should not be satisfied to permit it to continue, as there has been such a decided change for the better.

The airing given to transportation troubles was necessary as the only means of bringing about a public realization that conditions fundamentally wrong had to be corrected. The process of education thus given so much momentum by the dire necessity of the situation, has had a profound effect in the course of these few years in building up a public understanding of transportation. This has again placed the industry in a favorable position.

Furthermore, the transportation problems of the present day are so great and so varied, and they are increasing so much each year, that this industry offers opportunities for the exercise of engineering, financial, administrative and legal skill and vision beyond parallel in almost any other line of endeavor. The whole fabric of industry in the United States is so thoroughly interwoven with transportation that its development is bound to continue at a very rapid rate—and in a much more enlightened way in the future in view of the public knowledge on the subject that has been gained. The United States already has more transportation facilities than any other nation in the world, yet with the advent of the motor bus and motor truck we have only made a beginning to date in comparison with the development that is in prospect during the next twenty-five years.

The steam railroads and the electric railways are going to make extensive use of the gasoline propelled vehicles, and the automotive industry sees this and is lining up with these major transportation agencies for the policy of co-ordination of the various transportation facilities. In addition there is coming a truly remarkable use of automotive vehicles in fields not now served by rail transportation, and independent of the railway companies. A vital aid to this development is the rapidly spreading acceptance of the philosophy that transportation is too vital a public service to permit its destruction through competition, and therefore development will be aided by the sounder doctrine of utilizing each kind of transportation in its proper sphere in relation to the other kinds, in order to secure the most economical results while supplying the kind of service demanded by the public.

All of this active development simply points to the great need for the highest caliber of men—which means that transportation holds forth an attractive future for the young college graduate.

The Light-Weight Car Is Revolutionizing Light Interurban Practice

THERE was a time when no interurban operator would consider the use of any equipment but that of a heavy type similar to steam railroad coaches. These cars had motor equipment geared for speeds of 50 m.p.h. or even higher, but on many properties the trolley voltage fell so low due to heavy draft of current that the maximum speeds attainable in ordinary service were far below this. The heavy cars also proved very destructive to track and roadbed.

A much saner view of light interurban service has been taken in recent years. The principle of the light-weight car, so successful in city service, has been applied with equally good results in the interurban field. The use of one-man operation in interurban service has also been found entirely practical on many lines, introducing a substantial economy. It has been found that a car with properly designed entrance and exit can save time at stops, and by virtue of a large reduction in weight, the motor capacity can be made less and high rates of acceleration and reasonable running speed can be attained without excessive line drop. This in turn often gives an actual improvement in the average schedule speed. For example, it has been found in practice, as noted again in an article in this week's issue, that a certain type of car embodying these improvements, and having a rated maximum speed of 45 m.p.h., could make the same schedule as the old heavy type geared for 60 m.p.h., and with somewhat more leeway. Furthermore, the material reduction in energy consumption, when a line is operated with the light cars, often avoids the necessity, which the company faced with its old cars, of increasing power plant and substation capacity. Or if power is purchased, the light cars make possible not only a saving in the energy consumption, but they also reduce the maximum demand charge.

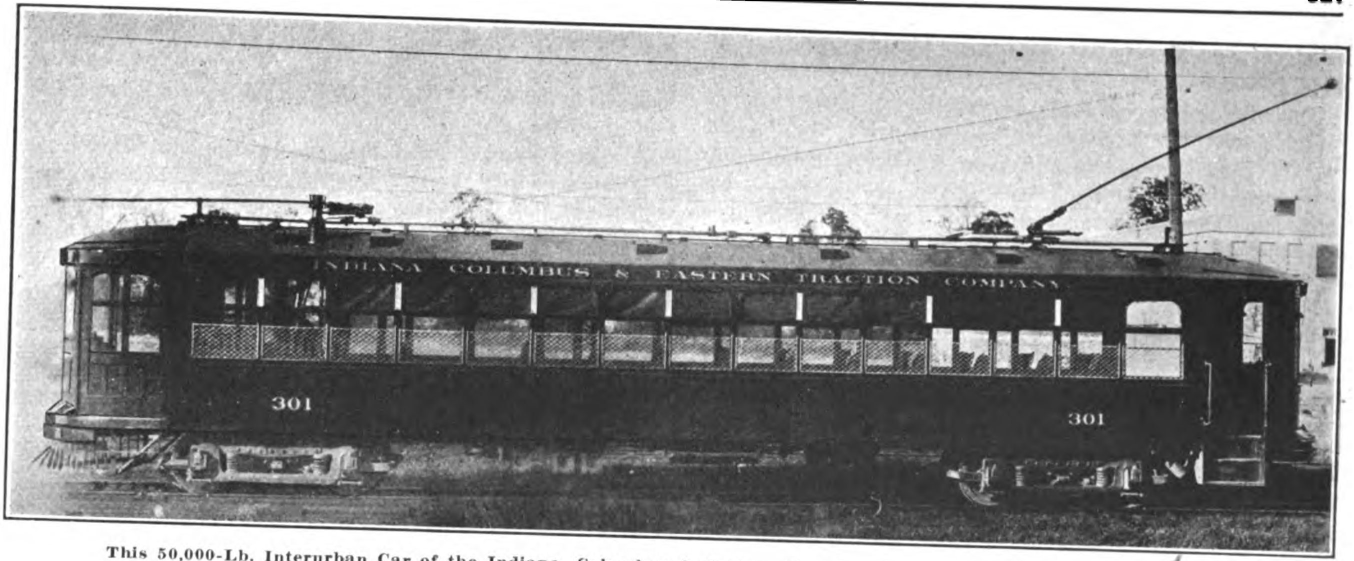
Every interurban manager using heavy cars will do well to study the results indicated in the article on page 927, and see if a similar plan for improved operation can be applied to his property. The use of these light cars is spreading at a remarkable rate. They afford an opportunity to give the public better service because of their lower operating cost; and more frequent headway will almost invariably create additional riding. More than one interurban that was a financial failure when operated along old-time methods has been placed on a sound basis and has been enabled to earn some return on the investment by getting rid of its old cars and substituting the light-weight one-man type.

Utility Debenture Bonds Are Sold on a 5⅝ per Cent Basis

ONE cannot read the pages of any financial paper, or the financial pages of any of our large metropolitan journals, without being impressed with the space given to public utility securities. One has only to compare this condition with that of ten or fifteen years ago to see the tremendous strides in public popularity which have been made by public utility securities as investments. Forty years ago the railroads presented the principal field for general security investment. Following this period came the industrials which now, if we include in this group the "motors," represent a large proportion of the securities whose sales are quoted on the exchanges. Up to the present most of the utility issues have been dealt in either locally or off the board in New York by investment houses, but that they are growing in public approval no one can deny. The fact that they are less subject to sudden fluctuations in business than the industrials and less affected by national labor movement than the steam railroads, commends them to the cautious investor.

In this connection there is food for thought that last month the investing public promptly absorbed an issue by the American Telephone & Telegraph Company of $100,000,000 in 5½ per cent debentures on a 5⅝ per cent basis. This is a large issue, even in these days of gigantic companies and big loans, yet these bonds were simply debentures without side frills like the assumption of 2 per cent for federal income tax or the 4 mill Pennsylvania or Connecticut tax. There are not many utility companies that could hope to do as well as this, even on a smaller issue. The telephone company is a national organization with property in every city, a long record of dividend payments in the past and net earnings many times the interest on these bonds. Its securities naturally attract a better market than even those of its local subsidiaries.

Nevertheless, the success of the sale should be encouraging to all other utilities. The various telephone companies controlled by the American Telephone & Telegraph Company are subject to the same kind of regulation as the electric railways and power companies; indeed they are under the same regulators in most states. They have as customers the same people as ride on the trolley cars and use electric light. They are affected by the same economic laws in regard to the purchase of materials and the hiring of labor. If the public has come to consider telephone issues as among the most desirable investments on the market, this sentiment is likely to be reflected also in the purchase of the issues of other utilities.



This 50,000-Lb. Interurban Car of the Indiana, Columbus & Eastern Traction Company Seats Fifty-eight and Has a Baggage Compartment. Its Free-Running Speed Is 55 M.P.H.

Experience Shows Light Cars Increase Net of Interurban Lines

Operating Results Analyzed on Several Properties Over a Period of Six Years Show Material Reduction in Operating Costs as Compared with Heavy Cars —The Light Cars Take Less Power and Can Make Schedules Better— Revenue Increases Have Followed the Improvements in Service Made Possible

By C. T. DeHore
General Electric Company, Cincinnati, Ohio

MODERN light-weight cars designed especially for interurban service have now been used for a sufficient length of time so that definite results are available for comparison with previous records. In practically all cases the savings have far exceeded expectations and have shown the car of this type to be far superior to the heavy and expensive type which it replaced.

The writer's attention was directed to the subject about six years ago, when the Cincinnati, Lawrenceburg & Aurora Electric Railway put into operation seven 26,000-lb. interurban cars, equipped with four 25-hp. motors geared for 35 m.p.h. After the order was placed and while the cars were being constructed every one connected with the proposition waited "in fear and trembling" to see what had been bought and how it would perform. That is now a matter of history. The saving has run about $40,000 a year.

After watching this installation the writer felt that there were wonderful possibilities in lighter-weight cars for all interurbans. The results obtained from actual operation from a number of installations at present under consideration are worthy of note.

In a number of instances the replacement of the heavy rolling stock with lighter-weight equipment has carried with it the abandonment of the railway company's old power plant and the purchase of power from a large central station. For instance, a small interurban road operating about 600,000 car-miles per year and using, say, 3,000,000 kw.-hr. may be generating its power in an old station for about 1.75 cents or a total cost of $52,500. To purchase such power at 1.5 cents from the central station would save $7,500 per year. This might not be enough reduction in cost to justify making a change. If, however, by reducing the weight of the rolling stock the energy consumption could be cut squarely in two, the cost of 1,500,000 kw.-hr. at 1.5 cents would be $22,500. This could not be compared with power generated in the old station at the previous rate, as the much smaller load would run up the cost per kilowatt-hour. The purchased energy for the light cars would show a saving of $30,000 total as compared with the energy for the heavy cars from the small station, and under these conditions probably would justify the change.

On other systems purchased power has not been available, but due to the lighter load fewer generators have been used, materially cutting down the amount of coal consumed. On still others it has been possible to shut down substations completely and to reduce the number of units used in substations.

Where railway companies furnish light and power, the reduction in demand and consumption is extremely important, particularly where this business is growing and the released station capacity can be immediately put to use.

The primary object of the light-weight car is to reduce the operating costs to such an extent that better service can be given to the public, which means increased receipts and improved public relations. On some roads the business available does not warrant much increase in service, but the economies effected by substituting car for car are very helpful in meeting bond interest.

Opposition has been shown to the so-called "light-weight" car by a great many operators, who were fearful that the car would not stand up. However, experience based on four to six years of operation of these cars has convinced the writer that such fears are ungrounded, and that the cars will stand up as well, or better, than the older heavy type of car.

In considering the "light-weight" car, it must be remembered that most of the weight saved has been in the trucks and motors, and what weight has been taken out of the body is useless weight from the standpoint of life and strength. For instance, one of the large city properties in the Central States recently purchased a number of 26,000-lb. passenger cars, seating fifty-two. It had some 33,000-lb. cars seating the same number, which were built nine years ago, and equipped with maximum traction trucks and two 65-hp. motors. It was decided to change these trucks and motors to four 25-hp. motors on 26-in. wheel trucks. This change reduced the weight of the car from 33,000 to 28,000 lb., or only 2,000 lb. more than the new light-weight car. The car builders advise that the remaining difference in weight was due to two things: First, the old car had a roof 8 in. higher than the new car; second, the excess weight of knee beams necessary to support the drop platform on the old type car.

The weights of passenger interurban cars in the Central States vary from 25,000 lb. to 102,000 lb. One truck equipped with two motors as used on some of the heavier cars weighs more than the entire car on other properties, and yet both cars are doing almost identical work. It is true that some of the heavier cars run faster than the light ones, but there ought to be some better way of getting a little more speed than to multiply the weight by four.

The number of light-weight installations has grown to such an extent that it is impossible for the writer to mention all of them or give the details of each, but the accompanying list covers a number of the interurban roads which have adopted the new idea. Specific references to some of these properties will show what results actually have been obtained.

Cincinnati, Lawrenceburg & Aurora—This is an interurban road 32.5 miles long operating half-hour service through a thickly populated suburban territory. Seven 26,000-lb. cars equipped with four 25-hp. motors have been in operation on this property for about five and one-half years.

A recent inspection of the cars proves that they have held up well and are in excellent condition, clean and well painted. There are no signs of deterioration other than ordinary wear and tear, and their maintenance has cost less than 1.5 cents per car-mile, averaged over the entire period. For 1923 this item is at the rate of 1.45 cents per car-mile.

These cars have made a total of 2,900,000 car-miles, or 414,000 car-miles per car in the five and one-half years of operation. The schedule speed is 20 m.p.h., with the stops per mile averaging 1.5. Energy consumption is 1.63 kw.-hr. per car-mile, which includes all losses to the a.c. bus. At a cost per kilowatt-hour, including substation expense, of 1.32 cents the energy cost per car-mile is 2.2 cents. The a.c. maximum demand for six cars is 203 kw.

The operating costs per car-mile for these cars are as follows:

	Cents per Car-Mile
Maintenance of way and structures	3.55
Maintenance of equipment	1.48
Power	2.20
Conducting transportation (two-man operation)	8.68
General and miscellaneous	3.60
Total	19.51

When this property purchased the light-weight cars it also shut down its old power plant and purchased two 200-kw. automatic substations. The net cost of making the change was $60,000. The saving per year has run about $40,000, or a total to date of approximately $220,000. The cars have just been equipped with safety features, and are now operated by one man.

Kentucky Traction & Terminal Company—This installation, with headquarters at Lexington, Ky., is the most interesting that has come to the writer's attention. Here was a company with a considerable amount of money invested in about 100 miles of electric railway. Bus competition suddenly developed on each of its four interurban lines. Realizing that a 36-ton two-man interurban car is a poor weapon with which to fight a 5-ton one-man bus, a very thorough investigation was begun at once of the merits and operating

LIGHT-WEIGHT INTERURBAN CARS IN USE OR ON ORDER BY ELECTRIC RAILWAYS

Road	Number of Cars	Type	Number of Operators	Weight, Tons	Years in Service	Length of Line, Miles
Central States						
Cincinnati, Lawrenceburg & Aurora	7	Passenger	1	13	5½	32
Union Traction Company (Nashville)	5	Passenger	1	14	4	28
	1	Express	2	16	4	
Cincinnati, Milford & Blanchester	3	Passenger	1	15	3	29
Pittsburg County Railway	3	Passenger	2	15	2½	25
Kentucky Traction & Terminal Company	12	Passenger	1	12½	1½	70
	2	Freight	1	14	1	
Toledo & Western Railroad	3	Passenger	2	13	1½	75
Youngstown & Suburban Railway	2	Passenger	1	14	1	39
Western Ohio Railway	8	Passenger	2	17	1	120
Fostoria & Fremont Railway	2	Passenger	2	17	1	22
Dayton, Springfield & Xenia Southern Railway	4	Passenger	2	13½	½	20
Chicago, North Shore & Milwaukee Railroad	2	Passenger	2	18	½	35
Cincinnati, Georgetown & Portsmouth Railroad	6	Passenger	1	12½	1	60
Maumee Valley Railways & Light Company	7	Passenger	1	12½	½	20
Northwestern Ohio Railway & Power Company	4	Passenger	2	17	*	60
Pennsylvania-Ohio Electric Company	12	Passenger	1	17	*	120
Indiana, Columbus & Eastern Traction	6	Passenger	2	25	*	300
Texas Interurban Railway (Dallas-Terrell)	6	Passenger	1	16	1	30
Indiana Service Corporation	6	Passenger	2	22	*	78
Eastern Wisconsin Electric Company	5	Passenger	1	18	†	42
Chicago, Aurora & Elgin Railroad	7	Passenger	2	17	*	24
Cleveland, Southwestern & Columbus Railway	12	Passenger	2	16	*	220
Eastern States						
Bangor Railway & Electric Company	6	Passenger	2	14	2½	66
Northampton Transit Company	8	Passenger	1	17	½	25
Warren & Jamestown Street Railway	4	Passenger	2	17	*	22
Shore Line Electric Railway (Norwich, Conn.)	5	Passenger	1	17	*	35
Conestoga Traction Company	5	Passenger	2	12½	*	160

* On order. † In service two months.

costs of light-weight interurban cars and motor buses. At the conclusion of the investigation it was decided to install light-weight cars, making them as comfortable and attractive as possible; to improve service by cutting headway from one and one-half hours to one hour, and to make a reduction in the rate of fare.

The results of the change were described at length in the ELECTRIC RAILWAY JOURNAL for Sept. 1, 1923, page 327. Some of the things that happened were that the company increased the car-miles 38 per cent, and the passengers carried increased 30.6 per cent. This was accomplished with a reduction of the ticket fares of 12.5 per cent, so that the passenger revenue was 12.7 per cent greater than before. The expenses per car-mile decreased 37 per cent, so that the net income from operation was 102.4 per cent greater with the new cars. The demand on the power station decreased 350 kw. Trains late decreased 64.2 per cent, and cars put out on account of such delays decreased 30 per cent.

The approximate cost of operation on this property is as follows:

	Cents per Car-Mile
Maintenance of way and structures	3.5
Maintenance of equipment	1.5
Power	3.4
Conducting transportation (one-man operation)	8.1
Traffic	0.5
General and miscellaneous	3.6
Total cost per car-mile	20.6

In the maintenance-of-way department prior to the installation of the light cars, the budget requirements per year were approximately 20,000 new ties. For the ensuing year, the requirement was only 9,000 ties.

Since the original installation of ten interurban passenger cars the company has purchased two additional interurban passenger cars, two light-weight interurban freight cars and twenty-seven light-weight single-truck city cars.

This property now has but one type of motor, wheel, axle, etc., for all of its forty-one new cars. All cars are operated by one man.

Cincinnati, Milford & Blanchester—This is an interurban road, 30 miles long operating hourly service. It also sells light and power. The new 30,000-lb. cars, equipped with four 25-hp. motors, have been in operation on this property for three years, with excellent results and low maintenance. These cars have averaged about 275,000 miles each and still have some of the original 26-in. wheels under them.

At the time the light cars went into operation the company also shut down its old 25-cycle power station and purchased 60-cycle power, replacing 1,100 kw. nominal rating in substations by 400 kw. The demand on the power station, which had previously required the railway company to run two 500-kw. engine-type generators, dropped to 315 kw. Since the change-over was made, the company has been able to go after the lighting and power business extensively, so that it has increased the lighting business over 200 per cent in the three years.

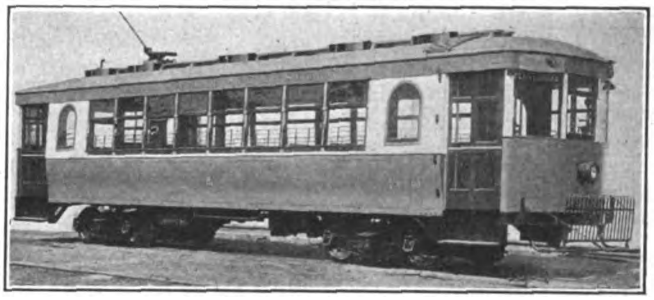
The cars are operated by one man with a fare-box system of collection. There are twenty-two fare zones, and no trouble has been experienced in making a schedule of 20 m.p.h. or in handling passengers.

As a result of the rehabilitation, this company has changed from a property that could not earn its bond interest to one that now pays a dividend on its common stock.

Cincinnati, Georgetown & Portsmouth—This road has about sixty miles of track; does a large carload freight business, and some light and power.

For a number of years the property has not been able to make any progress due to its obsolete power station, heavy cars and infrequent headway.

The management was changed about a year ago, and the new operators at once purchased four 12½-ton passenger cars, one express car of the same weight and four semi-automatic substations. The old plant was shut down and power purchased. The cars are equipped with safety features and are operated by one man.



This Interurban Car for the Maumee Valley Railways & Light Company Weighs 25,000 Lb. and Seats Forty-nine Passengers

The mileage has been increased about 25 per cent, and notwithstanding a considerable amount of bus competition, the railway is making a very satisfactory showing.

While the new system has not been in service long enough to make an exact comparison over a period of months, the following figures may be interesting:

	New System	Old System
Energy per car-mile, including locomotives, kw.-hr.	3.05	4.10
Cost of energy, cents per kilowatt-hour	1.21	1.74
Cost of energy, cents per car-mile	3.69	7.13
Power demand, in kilowatts	765	1,200

The reduction in power bill alone is now running at the rate of $24,000 per annum, and in maintenance of equipment at the rate of $3,600 per annum. These two items of saving will pay more than 30 per cent on the total investment, not considering any increased riding due to the 35 per cent increase in service. The results obtained have been so satisfactory that the company has ordered two additional cars.

Maumee Valley Railway—This company operates a belt line out of Toledo, having about twenty miles of track.

The company had been unable to make its operating expenses for some years past, and in 1921 was thrown into receivership, which lasted until December, 1922.

The old equipment was scrapped and replaced by seven 25,000-lb. cars equipped with four 25-hp. motors, single-end K control and safety features.

One-man operation was installed and six cars are now operated on fifteen-minute headway as compared to four old two-man cars on twenty-six-minute headway, an increase of about 42 per cent in service.

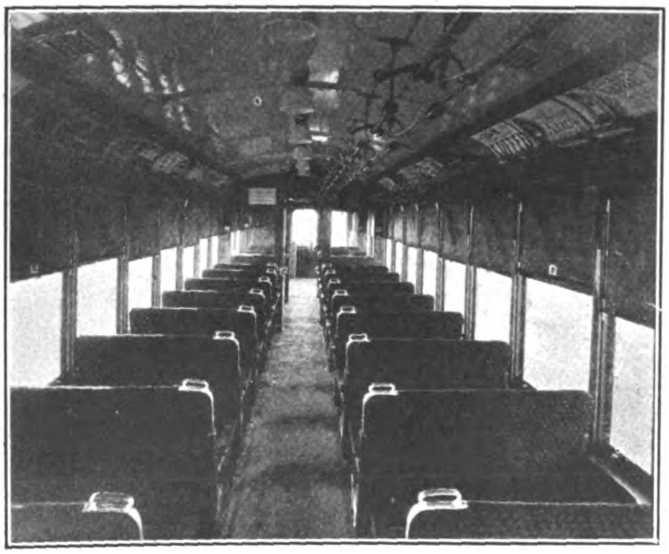
The public immediately showed that it appreciated the new cars and improved service by riding on them in considerably increased numbers. While the six-car schedule has only been in operation for ninety days, the indications are that the receipts have increased about 45 per cent. Serious bus competition has been encountered by this line. Whether or not the new cars and improved service, together with the new bus regulation recently passed by the Ohio State Legislature, will curtail bus activities remains to be seen. If they do, this road will be able to pay its way and further increase its rolling stock and improve its service.

Some of the comparative figures are given below:

	Old Cars	New Cars
Number of cars in operation	4	6
Headway, minutes	26	15
Operating costs, cents per car-mile	33	23.5
Receipts per month, approximate	$8,000	$11,500
Expenses per month	8,250	8,100

The results have been so satisfactory that the directors have authorized the purchase of three more cars.

Western Ohio Railway—This was the first high-speed line to adopt the light-weight cars. The cars weigh 34,000 lb., seat forty-eight people, are equipped with four 35-hp. motors and have a free running speed of 45 m.p.h. They make a schedule speed of 25 m.p.h. in local service and 31 m.p.h. in limited. They have been in service now for more than a year, and the average energy consumption at the car is running 1.27 kw.-hr. One rotary in each substation is now shut down, making a further reduction in power cost. A considerable reduction has been made in maintenance costs, both for labor and for material.



An Interior View of the Indiana, Columbus & Eastern Interurban Car

The running time has been cut slightly from what it formerly was. Even with this change the light cars geared for a maximum speed of 45 m.p.h. hold to the schedule better than did the old 35-ton cars geared for a maximum speed of 60 m.p.h. This is due to better line voltage, faster acceleration and quicker loading and unloading. For instance, in one of the winter months last year, with 2,220 trains, only twenty-one trains reached their destinations late, or less than 1 per cent.

Dallas-Terrell Interurban—This is a new road, 31.5 miles long, operating 16-ton cars with four 35-hp. motors. On the interurban section, 28 miles, the run is made in one hour.

Equipment maintenance has averaged 0.6 cents per car-mile, and energy used, including all losses, is running less than 2.5 kw.-hr. The railway is well satisfied with the results obtained; in fact, they have considerably exceeded expectations.

Indiana, Columbus & Eastern—This is the largest road in Ohio, and one which has a considerable amount of private right-of-way suitable for reasonably high-speed operation. Six combination baggage, smoker and main compartment cars, seating fifty-eight, equipped with four 60-hp. motors, geared for about 55 m.p.h. have just been put in service.

While these cars are for use primarily on the Dayton-Union City division, which is 55 miles long, they are geared so that they are capable of making limited runs on the Dayton-Columbus and Springfield-Lima divisions, where schedule speeds of 35 m.p.h. and better are maintained.

Cleveland, Southwestern & Columbus—The latest and also one of the largest interurban roads to begin the use of the light-weight car is the Cleveland, Southwestern, operating more than 200 miles of track.

The Southwestern has recently placed an order for twelve 32,000-lb. cars, seating fifty, equipped with four 35-hp. motors, geared for 45 m.p.h. These cars will completely equip what is known as the "Main Line, Western Division," running from Cleveland to Elyria, Oberlin and Wellington, a distance of 42 miles.

The company is purchasing these cars primarily in order to give better service, it being the plan to run half-hour service out of Cleveland, every other car being a limited. The cars themselves are designed to give the maximum comfort to the passenger, and no expense has been spared to get this result.

The outcome of this installation will be watched with interest all over the country, as the company is in competition with the New York Central Railroad and a large number of motor buses. The officials of the Southwestern believe that thirty-minute service in new, comfortable, easy riding cars will bring back to their road a large portion of the business now handled by private automobiles, motor buses and steam railroads. It certainly looks logical; no one knows how much patronage the buses can stand to lose, but unless all signs fail, the Southwestern is going to find out.

Other Properties—All of the other properties mentioned in the accompanying table are well satisfied with the change from heavy to light cars, and the writer does not believe there is a single instance where a return to the heavy car would be considered.

LIGHT CARS PERMIT ADDED SERVICE

The general possibilities available from the use of light-weight cars are many. Where one-man operation is used, it takes but 8 or 10 cents per car-mile additional to put on an extra car where it will relieve congestion and give real service. Such extra service reduces the number of private automobiles, and also reduces the number of "pick-ups" by such vehicles. These increased receipts gradually climb into a considerable number of dollars, and the railway companies that are in position to do these things by reason of having light-weight rolling stock are the ones that are most likely to make a profit.

A number of the installations of light-weight interurban cars mentioned in the accompanying table have been described in the pages of the ELECTRIC RAILWAY JOURNAL. Chief among them are the following:

Cincinnati, Lawrenceburg & Aurora, Dec. 13, 1919, page 915; Cincinnati, Milford & Blanchester, May 28, 1921, page 982; Kentucky Traction & Terminal Company, June 3, 1922, page 983, and Sept. 1, 1923, page 327; Youngstown & Suburban Railway, Jan. 27, 1923, page 181; Western Ohio Railway, Sept. 30, 1922, page 517; Chicago, North Shore & Milwaukee Railroad, Sept. 23, 1922, page 470, and June 9, 1923, page 959; Texas Interurban Railway, April 7, 1923, page 595; Bangor Railway & Electric Company, April 15, 1922, page 643.

Gaining Public Good Will in a City of 100,000*

Friendly Relations with Newspapers, Co-operation with City Authorities, Prompt Settlement of Claims, Courteous Trainmen, Clean and Freshly Painted Cars and Other Means Have Been Used Effectively in El Paso

POPULARIZING the street car service in El Paso, Tex., has largely been the result of gaining the good will of the public, of developing good relations between management and employee, and of conducting a very successful safety program.

The El Paso Electric Railway officials feel that it is difficult to say just how the public came to a realization of the fact that street railway transportation is of vital importance to it, and that it is even more difficult to attempt to set forth in anything like a brief statement the various methods which have been used to accomplish this end.

During the past year the company has used a very large amount of space in the daily papers telling the story to the public. That is one definite thing that has doubtless been of great help.

The company is a firm believer in the principle that the public is reasonable, and even generous, when it is fully acquainted with conditions, and has earnestly striven to interest it in the various phases of the company's business. The heads of departments are prominently identified with the local civic clubs, and several of them have been honored with the office of president. Through these clubs a very kindly feeling toward the company is built up, and newspaper articles on the business of the company frequently refer to the railway department as "Dixon's Railroad" (Alves Dixon is superintendent), or to "Warren's Company" (Alba H. Warren is manager). It is interesting to observe how quickly the public generally takes to this personal equation of the situation, and how quick patrons and customers are to speak to the individuals regarding the good points of the service. Whereas a few years ago complaints were numerous, both in the daily press and in the form of written and telephonic communications, the company is at the present time receiving at least twenty complimentary communications to one of an adverse nature.

GOOD SERVICE BUILDS GOOD WILL

This kind of public good will makes it possible to give better and better service, and the company states that its relations could hardly be improved upon. This is evidenced in so many ways that all of them could not be mentioned in an article of this kind. Several illustrations will prove of interest and are typical of the situation.

The citizens from a certain section of the city succeeded in eliminating jitney competition, despite the fact that the car fare is 6 cents, whereas the jitney fare was 5 cents. When a protest was made and the jitney men employed attorneys to fight the repealing ordinance these citizens again went before the Council and their spokesman, a minister, made such a splendid plea for the company and against the jitneys that the ordinance eliminating the jitneys was permitted to stand.

There are three daily papers in El Paso, and two of them are not only friendly to the company, but seem even eager to assist it in every way possible, both from the standpoint of news items and by editorial comment, on the way the business is being run. The other paper, which is owned by the Scripps McRae syndicate, has not attacked the company.

On the contrary, its news columns have been unusually fair, and an editorial complimenting the company on the courtesy of its trainmen appeared in one of its recent issues.

There has been no newspaper opposition to anything the company has done during more than a year. This has been due largely to the fact that before inaugurating a change the management has gone to the newspaper men, has discussed the proposed change with them, has given the reasons and has asked their advice. In every instance this plan has been entirely successful.

The result has been that the company has not only been able to avoid criticism, but has, on the contrary, had the active co-operation and editorial backing of the newspapers.

GETTING BACKING OF MUNICIPAL AUTHORITIES

That the municipal authorities appreciate that the company is trying to render the best possible service, and that its efforts are directed solely in the interest of the upbuilding of the city of El Paso, has been accomplished by thoroughly acquainting the municipal authorities with the difficulties of operating a street railway system in these days of high costs. This has been done through a comprehensive education in the details and problems of operating, maintaining and financing, which has cost no little time and effort, but according to the company the results have been well worth while.

Among other things, for example, when streets outside of the business district are paved, it is a practically settled policy that the tracks of the company are to be left unpaved, even though it is stipulated in the franchise that the company must pave when the streets are paved. This has saved approximately $200,000 during the past few years.

Appreciating the fact that some companies make the mistake of advertising and taking their story to the public only when in distress, the El Paso Electric Railway has, for the past year, been using regularly each week space in the local papers to convey information concerning some particular phase of the business. Sometimes these notices have described the workings of various departments, at other times they treat of some particular problem of the company as a whole. Frequently causes of certain types of accidents are mentioned and these are what are called "timely," such as warnings against tangling kites in electric wires during kite season, etc.

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*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

ADVISING THE PUBLIC OF SCHEDULE CHANGES

Whenever it is found necessary or advisable to change car schedules, the public is first notified through the newspapers and then cards are placed in all of the cars on the line affected. It is made a point to emphasize that the change is being made for the improvement of service, and the public has been found very appreciative of this advice. A serious handicap in the operation of the cars is the fact that two transcontinental railway lines run through the heart of the city within half a block of each other, and long and heavy trains frequently occasion considerable delay to the street cars. These trains, on account of the heavy grade, frequently stall or pull out a drawhead, and the service is then delayed longer than usual. On several occasions when the railroad made no effort to remove the trains promptly, the street cars have been delayed almost half an hour. On these occasions the company has advertised the cause of the delay in the local papers. This has not only enlightened the public as to the cause of the delay, but has been decidedly helpful in stirring up the railroads to act more promptly under similar circumstances.

Sometimes the claim department is unable to locate witnesses at the addresses given to conductors, and occasionally an out-of-town address is given. In such circumstances a questionnaire is sent them, and upon its return the company's acknowledgment thanking them for their kindness in mailing it. This acknowledgment is signed by the manager.

GOOD PUBLIC RELATIONS ASSIST IN INCREASING CAR FARE

In 1916 a strike of the company's trainmen took place, which was won by the company. Owing to the fact that El Paso is, to a considerable extent, a union town, this left much hard feeling. That this feeling has been overcome was very definitely illustrated when, two years ago, the company went before the City Council with its request for an increase in car fare. Not a single protest was raised. On the contrary, heads of several of the local unions and the managing editor of the local union paper were present and stated to the Council that they were of the opinion that the company was entitled to this increase. There has not been one single request for a decrease in fare in El Paso since that time.

CUSTOMER OWNERSHIP

The company believes that customer ownership is one of the biggest factors in the building up of the utility's public relations. It makes each patron, who is a security holder, a booster, provided that the company is properly managed and that the security holder receives a compensatory return on his investment. El Paso is one of the cities of the West where growth has been rapid during the past ten years. This has resulted in a scarcity of local investment capital and high interest rates. For example, the mortgage interest rate on commercial property with a 50 to 60 per cent equity is 8 per cent, and the interest rate on residential property is, in a large number of cases, higher. The common stock of this company is paying a 10 per cent annual dividend. With a par value of $100, its present market price is $126, making the annual return on this basis 7.9 per cent. The preferred stock is paying a 6 per cent annual dividend. With a par of $100 and an existing market price of $88, the annual return is 6.8 per cent. The 5 per cent first mortgage gold bonds of the company, due in 1942, are at present selling for $93, or at the rate of 5.4 per cent per annum.

Under these conditions it is most difficult to sell the bonds, common and preferred stock of the company yielding less than 8 per cent return to the investor in competition with an 8 per cent local interest rate. Again, the city is frequently floating a community enterprise of one nature or another, which affords greater dividends than the company can pay on its stock. For instance, money is now being raised for a 5,000-spindle cotton mill, on the theory that it will pay a 15 to 50 per cent annual return on the capital stock.

Despite the conditions above set forth, and at a time when new money was more costly than it is at present, in 1920 and 1921, the company sold locally to 512 customers a total of $268,800. The security issued was a 7 per cent five-year gold convertible note, and was sold at $96 and accrued interest to yield 8 per cent.

CO-OPERATION WITH POLICE DEPARTMENT

When a new chief of police was appointed several months ago, he was found exceedingly progressive and earnestly desirous of operating his department at the maximum of efficiency. The company has been helpful in traffic matters, and has assisted him in installing an up-to-date system for keeping record of traffic accidents. These records include maps where accidents, fights, burglaries, etc., are shown by location, and by the use of colored-headed pins indicating the type of occurrence. The company also supplied him with a clock chart, whereon the time of day when various types of accidents occur is indicated.

The company operates a telephone dispatch system, and the police department has been given keys to all of the telephone boxes. In return, the police department has furnished the company with keys to its telephone boxes, so that the co-operation between the two departments has been very helpful to both.

COURTEOUS TRAINMEN IMPORTANT

While it has long been realized that courteous trainmen are a valuable asset, this fact has not been fully appreciated until recently in El Paso, when the company has benefited in most unexpected ways and from unexpected quarters on account of some courtesy extended some one by its men. Not long ago an elderly lady who had stopped in El Paso a few days en route to Seattle wrote a friend in New York that one of the outstanding impressions of her trip across the country was the exceptional and remarkable courtesy of El Paso trainmen.

Trainmen are taught that they must be far better than merely good operators, and that each man in the organization must do his part toward selling the company to the public. It is astonishing how the men have taken this up themselves, and how they have gone even further in matters of courtesy than the company could expect or require. In addition to the instructions which new men are given in this respect, each man receives a special lecture twice a month by his divisional inspector.

Good-looking and attractive equipment is a very large factor in securing public good will, and though in El Paso it would be possible easily to run the cars eighteen months without repainting, the schedule calls for a new paint job every year. The principal difference is that by yearly painting the cars are kept bright and attractive, whereas when they are permitted to go for a longer period they become dingy and unattractive.

The cars are kept scrupulously clean, and never are permitted to go out in service with dirty windows.

PUBLIC SERVICE DEPARTMENT

The company has recently established a Public Service Department which performs a number of functions and has proved one of the largest factors in securing the excellent relations which the company now enjoys with the public. This department handles the various odds and ends which other departments have had to handle incidental to their regular business. Its activities comprise, among other things, the following: Advertising, handling of complaints, analyzing and filing all complaints, safety talks in schools, talks within the organization, talks among contact employees, talks among civic clubs, cultivating friendship of newspaper men, promoting the use of "Better Service" slips, entertainment of employees, such as dances, picnics, etc., educational work among the employees, which promotes a greater use of correspondence school courses, use of motion picture and stereopticon machines in getting the company's story over to the public and employees, establishing and charge of a company library, promoting greater use of the Boston Office Library, files and permanent forms of old newspapers and collections of clippings of all news items pertaining to the company. In addition this department is also in charge of the company's publication, *Cactus Points*. A closer contact with the various departments may be kept by every member of the organization through reading *Cactus Points*, and it is establishing a feeling of good fellowship which was never enjoyed prior to its publication.

In the handling of complaints this department is particularly valuable. A written complaint is immediately acknowledged, and if of any importance, by special delivery. The acknowledgment states that while the company regrets the necessity of the complaint, it is grateful to the writer for having taken the trouble to make it, and assures him that it will receive prompt and thorough attention. After the circumstances surrounding the complaint have been ascertained, the head of this department calls in person on the complainant and is almost invariably able to straighten it out to the entire satisfaction of all concerned. By the company's process of elimination, most of the causes of complaint can be disposed of, with the result that complaints become fewer and fewer in number. As an illustration of this, two years ago through the inspector of public utilities an average of twenty complaints a month was received. During the past year these complaints fell off to less than two a month, and quite recently the office of the inspector of public utilities was abolished, largely for the reason that complaints of street car service, which had formed a large part of its business, had been practically eliminated.

OTHER MEANS OF IMPROVING PUBLIC RELATIONS

An ordinance exists in El Paso prohibiting vehicles from passing street cars which are receiving or discharging passengers. Many automobilists are either unacquainted with or willfully violate this ordinance, and in order to help remedy the situation the word "Stop" has been painted on one of the folding doors. Some of these signs are painted on the wooden part of the door, and others on the glass. The ones on the glass are, perhaps, more easily seen at night, but both of them have aided very much in having automobilists bring their cars to a stop while the street cars are loading or unloading passengers.

Upon the company's initiative, without any suggestions from outside sources, its poles have been removed from the business districts, and, instead, span wires are fastened to adjacent buildings, greatly improving the looks of the streets.

In its advertisements and other ways the company, to a far-reaching extent, has sold to the public the idea that it is a local concern. All the company's trucks and automobiles carry the company name, and it is now planned to erect an office building to help maintain the "Home Company" idea. The company's name is displayed on the power plant, office building, etc. Following out this idea, the company has originated a letterhead which has been adopted by all Stone & Webster properties in the Texas district. This letterhead carries the names of the executives and departmental heads and their positions. This idea has lately been carried into the company's general advertising, the names of departmental heads being carried in advertisements affecting their department.

A further effort to localize the company is the practice of training the men for promotion. When a vacancy occurs anywhere in the organization, every effort is made to fill it from within the company's own ranks, and to go outside the organization only as a last resort.

It is planned to issue to the company's patrons on the first of the coming year a book giving the details of the activities of the company during the year just closed. This book will contain such information as it is felt the customer would like to know, and what the company would like to have him know about itself. Of late, the company has emphasized the three partners, i.e., customer, company and employee. Their wants must be fully satisfied before the company is willing to admit that its operation is, in every sense, successful.

Every year a report is issued to the stockholders, detailing such information therein as is believed will be of pertinent value. Through the medium of the company publication and various other means, employees are constantly advised of the company's activities. In other words, the company's activities are got over to the employees and the stockholders in a pretty definite and concrete way. The thought is that this should be done also for the patrons of the service.

This booklet will start out with a statement about the utility's aims and ambitions in the matter of serving its patrons; it will attempt to show the difference between operating a public utility and other businesses from a financial standpoint, with particular emphasis on the fact that the company turns its capital over only once every three or four years at best, and stressing the large amount of annual capital requirements.

Following this will be detailed the amount of money expended for construction during the year, stating precisely what the money was used for, why it was needed and the improvement that resulted because of the expenditure. What has been done to improve all personal contact relations with the patrons will be shown. Definite things that have been done to assist in the further growth of the prosperity of El Paso will be mentioned. Figures and statistics will also be presented showing the growth of the company, special consideration being given to kilowatt-hour output, car-miles run, analysis of accident situation, and other pertinent statistics of similar nature. Figures will be given as to the capacity and nature of equipment in the power plant, number of street cars owned, miles of track, etc. The company's income and detailed expenses will be shown. A copy of the balance sheet will be included.

Photographs of the officials and executives of the company will be shown, possibly with group photographs of the various departments, with a little story as to the part each plays in rendering service. It will also contain a statement showing the small proportion of a man's annual income that is spent for utility service, and other things tending to illustrate and prove the cheapness of electric service.

The company's final thought is that this booklet will portray to the patrons, a splendid idea of the company's activities and is calculated to improve and build up public confidence in and an appreciation of the problems of a street railway company.

Railway Finds New Source of Revenue

Steel Dump Cars Increase the Income of the Wheeling Traction Company by Hauling Mine and Power Waste on Contract Basis

THE Wheeling Traction Company does not rely for revenue only on its passenger transportation business or interurban express service. The railway has availed itself of an opportunity that was presented to solve the problems of two brother utilities—a power plant and a coal mine—and at the same time improve its own finances. After the completion of the 150,000-kw. power plant of the Beech Bottom Power Company at Windsor, W. Va., some means of disposing of the ashes from the boilers had to be found. A hopper car stationed on a siding into which the daily refuse would go was out of the question because the plant was not situated adjacent to a steam railroad. The traction company's right-of-way, however, passes close by the power plant and a spur siding made it possible to bring its cars very conveniently to a loading hopper.

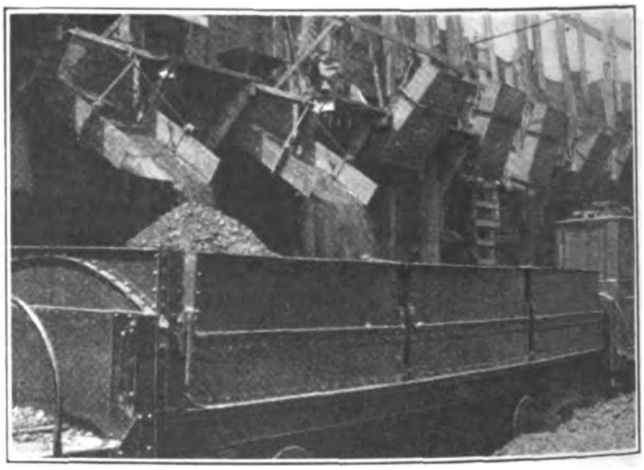
For the railway the proposition meant a considerable expenditure for equipment to handle the work. Steel dump cars were recommended as the best for this purpose, and arrangements were made for the disposition of 490 tons of cinders daily.

Three Differential dump cars constituted the initial equipment. It was planned to use two motor cars and a trailer in train operation. Each one of the three cars equipped with additional side boards has a capacity of 18 tons. The motor cars are propelled by quadruple equipments of Westinghouse 532-A motors, each motor having a 50 hp. capacity. Electro-pneumatic HL control is provided for double-end control and arranged for multiple-unit operation, as is required when the three dump cars are used together. The dumping mechanism is operated by a Westinghouse type "HK" 5-hp. motor and a type 810 switch and control panel.

Three-Car Train of the Wheeling Traction Company, Consisting of Two Motor Dump Cars and One Trailer

Another matter of importance was a suitable and convenient location where the ashes could be disposed of. The owner of a ravine at Glenn's Run, Warwood, consented to have the ashes used for filling the ravine, the depth of which averaged 35 ft. The fill extends over an area of about 15 acres. From the cinder pit at the power plant to the dump the distance is about 5½ miles.

Another opportunity for additional revenue was grasped by the railway management a short time after it had begun serving the power company. At a mine belonging to the Richland Coal Company the point had been reached where some disposition of the "gob" must take place immediately. The traction company again offered a proposition similar to that accepted by the power company. Tracks were laid, another dump car purchased and today the daily refuse of from 150 to 200 tons is being handled with mutual satisfaction. The mine "gob" is hauled about 2.2 miles to the dump.



Loading Ashes at the Power House Hoppers

Filling in a Deep Ravine with the Ashes

Automatic Feeder Control Prevents Service Interruptions

A Combination of Automatic Substation and Special Automatic Feeder Operation with Supervisory Control Insures Continuity of Service on Cleveland Railway Lines—Short Circuit Is Burned Off, Without Shutting Down the Section, by Connecting Several Feeders to the Shorted Line Through Resistance

By Maurice E. Reagan

Switchboard Engineer Westinghouse Electric & Manufacturing Company

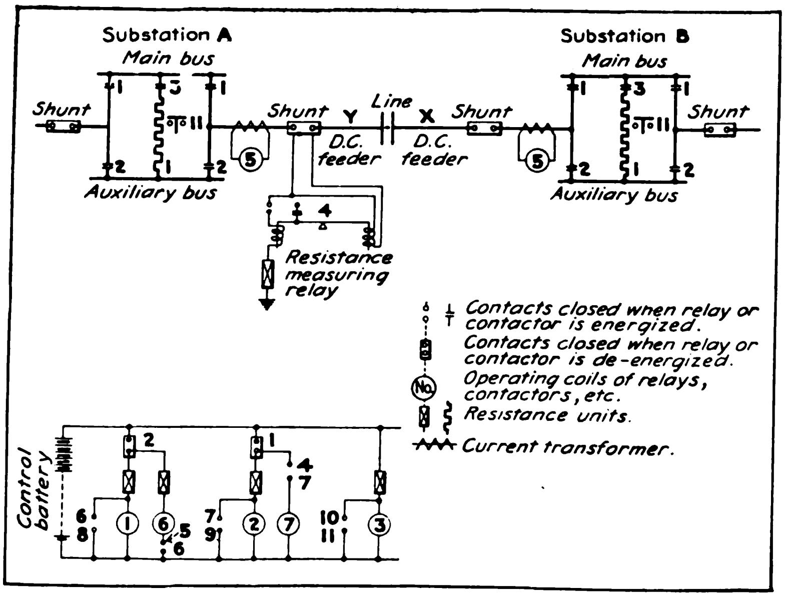
A PLAN has been devised and applied on the system of the Cleveland Railway whereby the individual feeders are automatically controlled, but the load dispatcher is given a chance to transfer the circuits in case of a short circuit in such a manner that the short may be burned off without taking an entire feeder section out of circuit. This has been accomplished by the use of a number of new devices worked out to meet the peculiar conditions prevailing on the metropolitan city system and applied first on the Cleveland Railway system.

In order to understand fully what has been accomplished in this installation, the distinctions between automatic substation control of the ordinary type and this Cleveland installation will be sketched briefly.

EARLY AUTOMATIC CONTROL UNSUITABLE

In the earliest form of automatic feeder control, both for light and heavy traction service, large-capacity iron resistance units were inserted in a feeder circuit upon occasion of overload on that section. The overloaded feeder would thus operate on reduced voltage from at least one of its ends during the period, while remaining sections feeding from the same station would be undisturbed. Satisfactory results were obtained by the foregoing method when the effective resistance of the circuit consisting of feeder cable, trolley, and rail return to the nearest adjacent "feed-in" point was comparatively high, as is the case in light traffic centers.

In heavily loaded districts encountered in city service the relative resistance of feed-lines is low. Also, the majority of urban feeders are connected to more than one station. The insertion of a resistance in the feeder circuit lowers the voltage, and shunts a portion of the load to other adjacent stations feeding the same section. Of course, the right value of resistance must be used, or too great a share of the load may be transferred to the other station, resulting in the automatic insertion of resistance at that point. If enough load is dropped from the near-by station, the breaker at the near end recloses, and surging back and forth is inevitable. Furthermore, if the overload persists long enough to overheat the resistance at any station, the feeder is


Substation A
Main bus
Shunt
Shunt
Y
Line
X
Shunt
D.C. feeder
D.C. feeder
Substation B
Main bus
Shunt
Auxiliary bus
Auxiliary bus
1
3
11
2
5
4
Resistance measuring relay
Contacts closed when relay or contactor is energized.
Contacts closed when relay or contactor is de-energized.
Operating coils of relays, contactors, etc.
Resistance units.
Current transformer.
Control battery
6
8
7
9
10
11

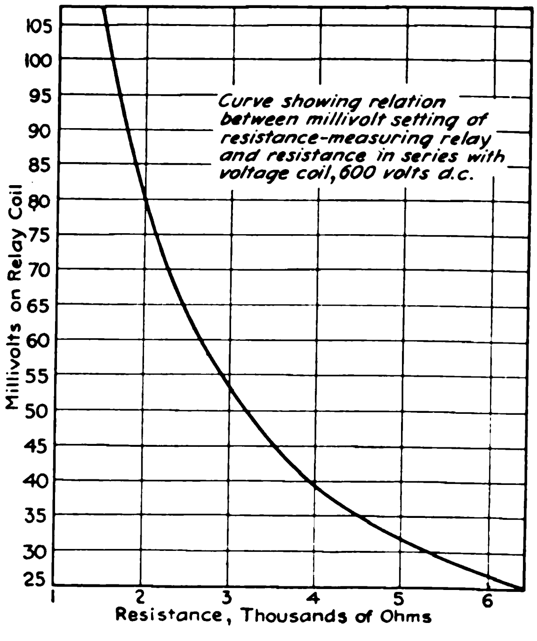


Fig. 1 (At Left)—Typical Cleveland Feeder Layout with Automatic Control. Fig. 2 (At Right)—Relation Between Setting of Resistance Measuring Relay and Resistance in Series with Voltage Coil at 600 Volts

KEY TO FIG. 1

1. Contactor connecting feeder to main bus.
2. Contactor connecting feeder to auxiliary bus.
3. Bus-tie resistance contactor.
4. Resistance measuring relay.
5. Short-circuit detector relay.
6. Auxiliary short-circuit detector relay.
7. Auxiliary reclosing relay.
8. Supervisory control relay.
9. Supervisory control relay.
10. Supervisory control relay.
11. Bus-tie resistance protective thermostat.

X. 80 per cent of distance from station A to station B.

Y. 80 per cent of distance from station B to station A.

disconnected from the bus until the resistance cools. In the meantime, the cars supplied by this feeder are without power. Also, during the period of greatest load lower voltage is supplied to the cars, causing lower speeds and greater congestion.

The above principle of operation was, therefore, found entirely unsuited for heavy traffic conditions where two or more substations were automatically operated in parallel. Since the machines in the substations had sufficient capacity for any legitimate load, only trouble on the feeder system should disturb the flow of energy. The machines being protected from overheating, it should be necessary to disconnect a feeder from the bus only in case of a short circuit on it.

AUTOMATIC RELAY DETECTS SHORT CIRCUITS

To take care of this condition, a device known as the "short-circuit detector" was developed, by means of which the feeder breaker would remain closed through all periods of overload. Only a short circuit would cause it to open. This relay consisted of a sensitive moving element whose operating coil was connected across the secondary of a current transformer. The primary of the current transformer was the main outgoing feeder cable. The iron circuit of the current transformer had a small air gap to prevent saturation from the normal direct-current load and give a straight saturation curve. Then a short circuit of a certain resistance would induce a definite current in the secondary of the transformer regardless of the direct-current load being carried at the time the ground occurred.

The time required for the current to reach its maximum value on closing a circuit depends on the inductance of the various portions of that circuit. Thus with the sudden application of an inductive load, such as street car motors, the current will build up so slowly as to induce very little energy in the secondary of the current transformer. Since a short circuit has little inductance, the rise of current presents a very steep wave front, transferring a large amount of induced energy to the transformer secondary and hence to the relay coil. The current induced in the secondary of the transformer is then a direct measure of the value of the short circuit. If the current flowing exceeds a certain amount it is desirable to disconnect the feeder from the main station bus. The relay acts accordingly, and the feeder breaker opens.

Shortly after the feeder breaker opens, a circuit operating on the Wheatstone bridge principle is set up to measure the resistance of the feeder circuit, the object being to indicate when it is safe to reconnect the feeder to the main station bus. As the ground is removed the resistance suddenly rises and the reclosing relay sets up the circuit for reclosing the contactor. This scheme of operation keeps the section dead until some one picks up the broken trolley or in some other way removes the low resistance path.

PRECAUTIONS TO PREVENT SERVICE INTERRUPTIONS

On systems such as the Cleveland Railway every precaution is taken to prevent the slightest interruption. Provision had therefore to be made to keep power on the section of line affected by the short circuit, if possible.

Each substation has two direct-current buses. The main bus normally is connected to the positive terminals of the converters when they are in operation, while the second or auxiliary bus is connected to the main bus through a high capacity resistance by means of a contactor. Each outgoing feeder has a double contactor arrangement so that it may be connected to either the main or the auxiliary bus. The two contactors are so interlocked, however, that only one of them may be closed at one time.

The feeder contactor connecting to the main bus may be opened in two different ways. The first is automatic, through action of the "short-circuit detector" upon occasion of a ground. The second is by means of the "supervisory control system" at the will of the load dispatcher. This man, located in a downtown office, has before him an operating board displaying two lamps corresponding to each contactor and each main piece of apparatus in the substation. One lamp is red, the other white. The red lamp shows that the particular part of the equipment to which it corresponds is in the closed or energized position. If the position of any portion of the equipment in any substation changes, the dispatcher gets an immediate indication by means of the change in lamp signals. The system of remote control provided enables the dispatcher to transfer any feeder from the main to the auxiliary bus, retransfer it back to the main bus, or lock it out of service entirely by opening both contactors.

AUXILIARY BUS USED TO INSERT RESISTANCE WHEN A GROUND OCCURS

In normal operation all feeders are connected to the main bus, with the bus-tie resistance connected ready for operation. Should a ground occur, the feeder on which it occurs is at once automatically transferred to the auxiliary bus. The feeding is then from the main bus through the bus-tie resistance to the auxiliary bus and thence into the short-circuit. The load dispatcher is at once informed by the corresponding change in lamp signals that the feeder has been transferred. He also gets an approximate indication of the voltage on the auxiliary bus, which gives him some idea of the resistance of the fault. Following out the object of this special arrangement, which is to clear the trouble as quickly as possible, he transfers other feeders in the station from the main to the auxiliary buses in order to raise the voltage. This causes a larger flow of current into the faulty section and the ground is soon burned clear.

When the fault is removed, all feeders must automatically retransfer to the main bus. To ascertain if the line is clear, the resistance of the circuit in trouble is being measured while the feed is taken through the auxiliary bus. The usual resistance-measuring relay which operates on the Wheatstone bridge principle is not applicable in this system, since the voltage of the auxiliary bus may have any value up to 600. A relay is required which will measure a resistance from a variable voltage source. This has been taken care of by a type of resistance-measuring relay which has two operating coils pivoted on a common balance arm. One of the coils is connected with a variable resistance in series between the auxiliary bus and ground; the other coil is connected across a shunt in the outgoing feeder circuit. Hence, one coil measures the voltage of the auxiliary bus, while the other determines the flow of current into the fault. At a point slightly below that set for reclosing, the two coils are calibrated to have the same pulling effect, so that a balance is reached.

When a feeder has been grounded and has been transferred to the auxiliary bus, this relay is placed in the circuit automatically, with the current coil overbalancing the voltage coil. If the resistance of the short-circuited feeder remains constant while the voltage of the auxiliary bus rises, the pull of the voltage coil increases. However, this is accompanied by a corresponding increase in the pull of the current coil. Thus the relay gives an accurate measure of the resistance, regardless of the value of voltage on the auxiliary bus. As the resistance rises to a value at which it is permissible to reclose the feeder to the main bus without again operating the "short-circuit detector," the relay acts, making a contact to retransfer the feeder.

The coil of the "short-circuit detector" relay which is connected across the secondary of the transformer has several taps brought out so that the relay may be calibrated by changing one screw on the terminal board. Each feeder on the system has an individual setting depending on its resistance to the nearest adjacent feeder station. Having determined the corresponding short-circuit current, 80 per cent of this value is taken as the value at which the "short-circuit detector" should operate.

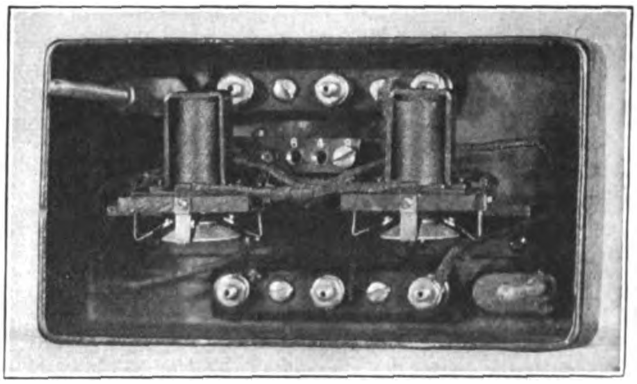
Referring to the diagram of connections given, this means that a short circuit occurring on the right hand side of point *X* would transfer the station *B* feeder to the auxiliary bus but would not affect station *A*. On the other hand, a short occurring to the left of point *Y* would cause a transfer of the connections at station *A* but would not affect station *B*. However, should trouble take place between *X* and *Y*, both stations would be transferred. The reason for this arrangement is that this same feeder may be used to carry current to burn off a ground on some other feeder leading out of the far station. It would be undesirable to transfer it to the auxiliary bus at the near end if connected to the auxiliary bus at the far end by the load dispatcher. The proper calculation is made on each individual feeder circuit, and a relay setting is made to correspond. In case a radical change is made in the feeder circuits a new relay setting is required.

OPERATION OF RECLOSING RELAY

After the tripping value of the feeder has been determined by the foregoing method, the reclosing relay is set at a point approximately 25 per cent below this amount. As stated before, this adjustment is accomplished by the variation of a resistance in series with the voltage coil of the resistance-measuring relay. Suppose, for example, a feeder is set to transfer on a short circuit of approximately 2,000 amp., and it is desired to retransfer the feeder to the main converter bus when the resistance of the feeder is such that 1,500 amp. will flow when connected to a 600-volt circuit. Since the current coil is connected to a 2,000 amp. shunt, there will be approximately 37.5 millivolts on the current coil at the point of retransferring. Approximately 40 millivolts are required on the voltage coil to overbalance and make contact. By referring to the curve, the necessary amount of resistance to have in series with the voltage coil is determined to correspond with 40 millivolts and set the rheostat accordingly.

The feeder usually transfers from the main to the auxiliary bus only upon occasion of a short circuit. At such a time precautions must be taken to keep the converter from dangerous flashing. As the heavy load is thrown onto the converter, the armature is pulled back from the synchronous position an amount depending on the resistance of the ground. If the load is suddenly removed by opening the feeder breaker, the armature jumps quickly ahead to a position as determined by the remaining legitimate load. All of the armature energy corresponding to the difference in phase position is given up. If this amount of energy is great enough, the converter will flash.

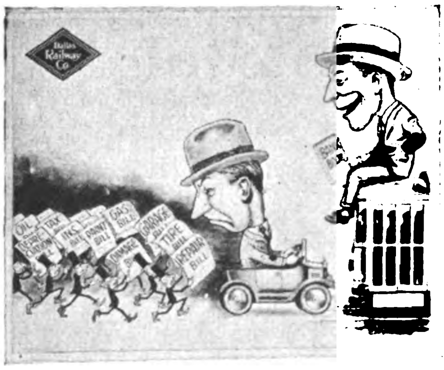
Developments at the present time to prevent flashing include high-speed breakers, having enough feeder resistance between the machine and the first connection to the trolley or by the insertion of sufficient resistance in the machine circuit to limit the current to a value within the commutating capacity of the converter before opening the circuit. The use of the high-speed breaker, which opens the circuit before the armature can be pulled a dangerous amount away from the synchronous position, entails features such as opening under a slight reduction of voltage, etc., which renders it undesirable for such application. Having a permanent resistance of sufficient value in the feeder is also undesirable because of the constant loss, the drop in voltage under heavy loads, and the extra copper required to feed the territory nearest to the station.

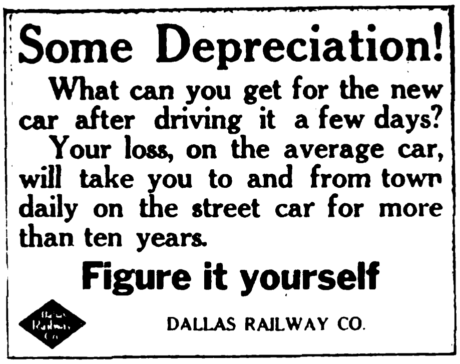


Short-Circuit Detector Relay and Auxiliary Relay, Nos. 5 and 6 in Fig. 1

The system now in use in Cleveland temporarily inserts resistance in the machine circuit for several cycles before the feeder breaker opens. This allows time for the armature to settle in a position from which all load may be suddenly relieved without causing damage. To accomplish this, an air-gap current transformer with a "short-circuit detector" is placed in each machine circuit as well as each feeder circuit. The impulse from the steep wave-front current curve starts both the machine and feeder "short-circuit detectors" operating at the same instant. The time differential comes from the difference in timing between the two contactors. As soon as the feeder breaker opens, disconnecting the feeder from the main bus, the resistance is removed from the machine circuit.

The majority of contactors used in railway feeder application have been of the magnetic type. The natural limitation of this type of contactor is that it will not close on less than 60 per cent of normal voltage. However, since a feeder should be operative when the station is out of service so that other stations may feed through to sections out of their normal zone, the energy for closing the feeders must come from some separate and reliable source. Pneumatic contactors similar to those in use for years in railway car and locomotive service have been adopted in Cleveland. The energy to operate the air valves is supplied by a storage battery.


Dallas Railway Co.

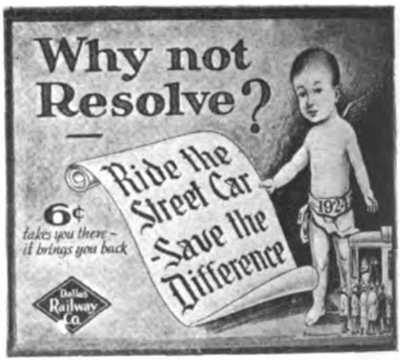


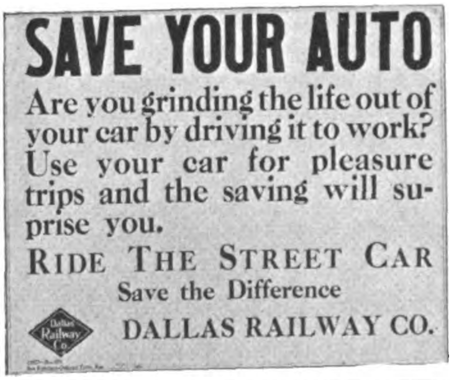
Some Depreciation!

What can you get for the new car after driving it a few days? Your loss, on the average car, will take you to and from town daily on the street car for more than ten years.

Figure it yourself

DALLAS RAILWAY CO.


Why not Resolve?
Ride the Street Car Save the Difference
6¢ takes you there – it brings you back
1924
Dallas Railway Co.

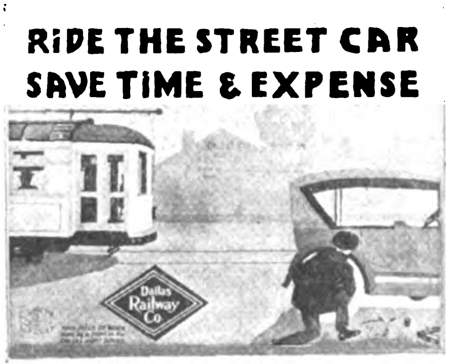


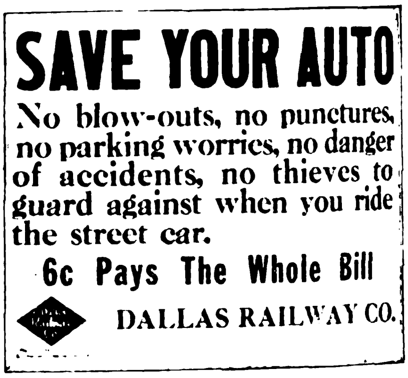
SAVE YOUR AUTO

Are you grinding the life out of your car by driving it to work? Use your car for pleasure trips and the saving will suprise you.

RIDE THE STREET CAR
Save the Difference

DALLAS RAILWAY CO.


RIDE THE STREET CAR
SAVE TIME & EXPENSE
Dallas Railway Co.

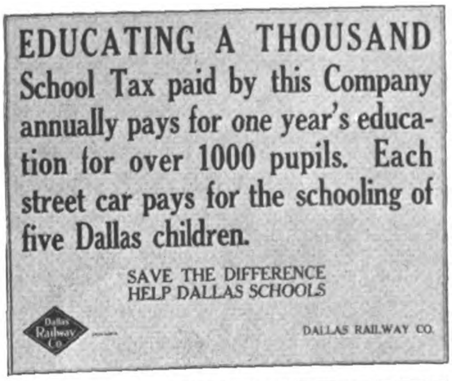


SAVE YOUR AUTO

No blow-outs, no punctures, no parking worries, no danger of accidents, no thieves to guard against when you ride the street car.

6c Pays The Whole Bill

DALLAS RAILWAY CO.

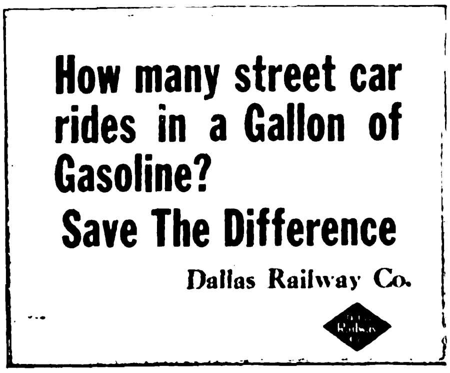


EDUCATING A THOUSAND

School Tax paid by this Company annually pays for one year's education for over 1000 pupils. Each street car pays for the schooling of five Dallas children.

SAVE THE DIFFERENCE
HELP DALLAS SCHOOLS

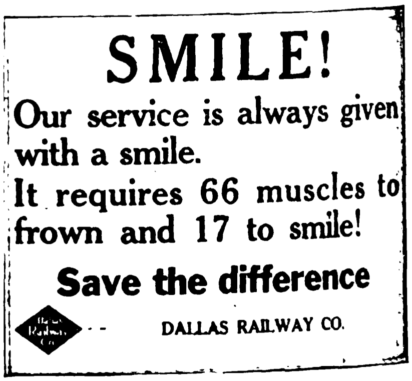
DALLAS RAILWAY CO.



How many street car rides in a Gallon of Gasoline?

Save The Difference

Dallas Railway Co.



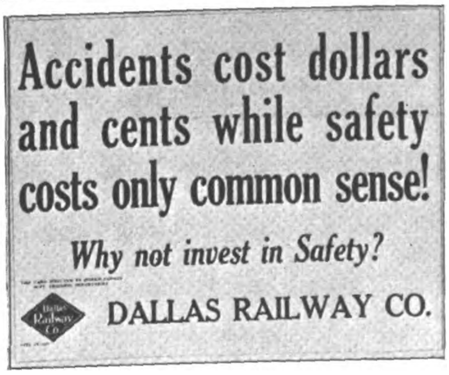
SMILE!

Our service is always given with a smile.

It requires 66 muscles to frown and 17 to smile!

Save the difference

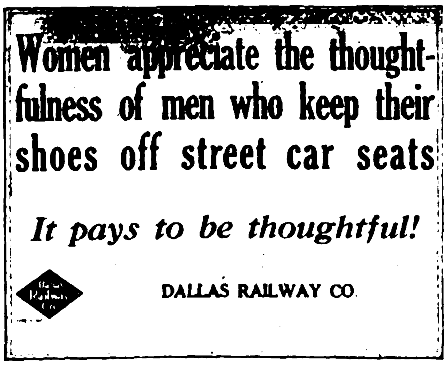
DALLAS RAILWAY CO.



Accidents cost dollars and cents while safety costs only common sense!

Why not invest in Safety?

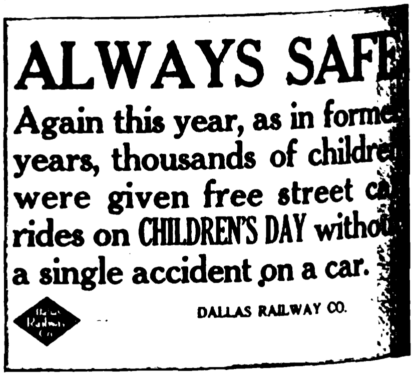
DALLAS RAILWAY CO.



Women appreciate the thoughtfulness of men who keep their shoes off street car seats

It pays to be thoughtful!

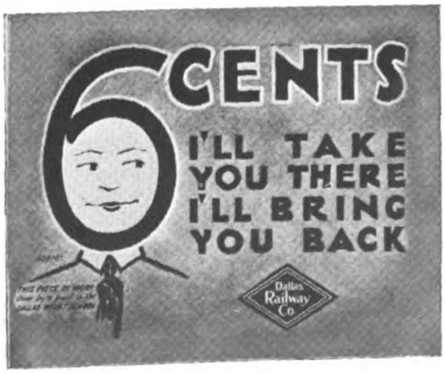
DALLAS RAILWAY CO.

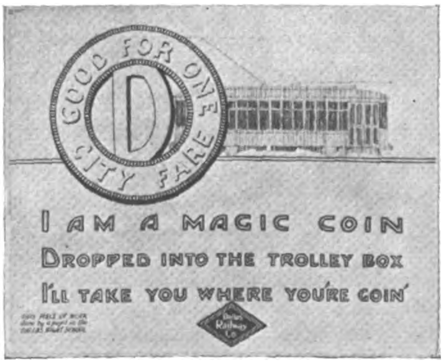


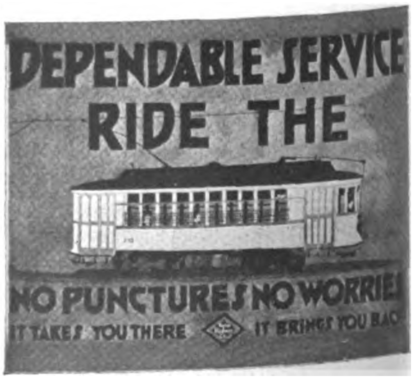
ALWAYS SAF

Again this year, as in forme years, thousands of childre were given free street c rides on CHILDREN'S DAY witho a single accident on a car.

DALLAS RAILWAY CO.


6 CENTS
I'LL TAKE YOU THERE
I'LL BRING YOU BACK
Dallas Railway Co.


GOOD FOR ONE CITY FARE
D
I AM A MAGIC COIN
DROPPED INTO THE TROLLEY BOX
I'LL TAKE YOU WHERE YOU'RE GOIN'
Dallas Railway Co.


DEPENDABLE SERVIC
RIDE THE
NO PUNCTURES NO WORRIE
IT TAKES YOU THERE
IT BRINGS YOU BAC

Selling Transportation

A few examples of the effective car-card advertising used by the Dallas Railway Company

Census Figures for Nine More States

These Reports Follow the Trend Indicated in the Census Statements Previously Published—The Track Mileage Has Decreased Slightly Since 1917—Incomes of Electric Railways in These States Have Increased on Account of Higher Fares

Washington—**A decrease of 6.5 per cent occurred in track mileage and a decrease of 6.8 per cent in the number of passengers carried. Gross railway operating revenues amounted to $13,852,442 in 1922, an increase of 52.1 per cent as compared with 1917, but on account of a more rapid increase in expenses net income decreased by 57.8 per cent.**

	1922	1917	Per Cent of increase, 1917–1922†
Number of operating companies	**19	20	......
Miles of single track operated††	1,001.69	1,071.33	*6.5
Number of cars, all types	1,988	1,969	1.0
Number of electric locomotives	31	30	......
Number of persons employed	4,578	5,857	*21.8
Salaries and wages	$7,125,954	$6,291,027	13.3
Primary horsepower, total	27,985	274,224	*89.8
Kilowatt capacity of generators	17,700	173,160	*89.8
Current generated, kilowatt hours	75,510,512	626,948,720	*88.0
Current purchased, kilowatt hours	191,120,960	116,797,063	63.6
Passengers carried	§173,728,486	186,361,737	*6.8
Revenue car mileage	36,299,115	36,128,262	0.5
Railway operations, revenues	$13,852,442	$9,109,642	52.1
Railway operations, expenses	$10,903,804	$6,624,286	64.6
Net revenues, railway operations	$2,948,638	$2,485,356	18.6
Auxiliary operations, revenues	$1,315,885	$6,305,468	*79.1
Auxiliary operotions, expenses	$786,606	$2,694,495	*70.8
Net revenues, auxiliary operations ¶	$529,279	$3,610,973	*85.3
Net operating revenues	$3,477,917	$6,096,329	*43.0
Taxes assignable to railway operations	$599,788	$1,296,612	*53.7
Operating income	$2,878,129	$4,799,717	*40.0
Non-operating income	$576,290	$653,940	*11.9
Gross income	$3,454,419	$5,453,657	*36.7
Interest and other deductions from gross income	$2,898,121	$4,136,448	*29.9
Net income	$556,298	$1,317,209	*57.8

** Reduction in companies due to mergers.

†† Includes 48.62 miles in 1922, and 49.73 miles in 1917 lying outside the state, but owned by companies within the state, and excludes 0.5 mile in 1922 and 0.09 mile in 1917 operated in the state, but owned by companies outside the state.

§ In addition there were 713,798 passengers carried by twenty-six motor buses operated by electric railway companies.

¶ Chiefly revenues from electric light and power departments of electric railways.

Indiana.—**In spite of a decrease of 2.4 per cent in track mileage, there was an increase of 13.4 per cent in the number of passengers carried. Gross railway operating revenues amounted to $24,700,557 in 1922 as compared with $17,127,101 in 1917, a gain of 44.2 per cent.**

	1922	1917	Per Cent, of Increase 1917–1922
Number of operating companies	†27	32	......
Miles of single track operated‡	2,297.00	2,353.18	*2.4
Number of cars, all types	2,908	2,692	8.0
Number of electric locomotives	12	9	......
Number of persons employed	8,855	8,184	8.2
Salaries and wages	$10,509,432	$6,586,842	59.6
Primary horsepower, total	149,115	168,883	*11.7
Kilowatt capacity of generators	114,625	125,262	*8.5
Current generated, kilowatt-hours	297,116,367	288,205,284	3.1
Current purchased, kilowatt-hours	96,633,780	71,298,793	35.5
Passengers carried	262,320,348	231,290,386	13.4
Revenue car mileage	58,551,813	52,213,871	12.1
Railway operations, revenues	$24,700,557	$17,127,101	44.2
Railway operations, expenses	$17,874,164	$11,429,824	56.4
Net revenues, railway operations	$6,826,393	$5,697,277	19.8
Auxiliary operations, revenues**	$3,743,959	$2,401,910	55.9
Auxiliary operations, expenses	$2,215,513	$1,287,248	72.1
Net revenues, auxiliary operations	$1,528,446	$1,114,662	37.1
Net operating revenues	$8,354,839	$6,811,939	22.7
Taxes assignable to railway operations	$1,766,198	$867,049	103.7
Operating income	$6,588,641	$5,944,890	10.8
Non-operating income	$424,183	$400,342	6.0
Gross income	$7,012,824	$6,345,232	10.5
Interest and other deductions from gross income	$5,215,951	$5,341,878	*2.4
Net income	$1,796,873	$1,003,354	79.1

† Reduction in companies due to consolidations and to the fact that four companies with 28.22 miles of track discontinued operations prior to 1922.

‡ Includes 31.20 miles in 1922 and 33.03 miles in 1917 lying outside the state, but owned by companies within the state, and excludes 44.47 miles in 1922 and 35.43 miles in 1917 operated in the state, but owned by companies outside the state.

** Chiefly revenues from electric light and power departments of electric railways.

New Jersey.—**The figures show a slight decrease in track mileage and a reduction of 12.8 per cent in the number of passengers carried. Gross railway operating revenues amounted to $31,716,476 in 1922, an increase of 42.8 per cent as compared with 1917, but owing to a more rapid increase in operating expenses and taxes, the net income from all sources decreased by 95.1 per cent during the five-year period.**

	1922	1917	Per Cent of Increase, 1917–1922
Number of operating companies	†19	22	......
Miles of single track operated‡	1,329.22	1,354.35	*1.9
Number of cars, all types	3,359	3,364	*0.1
Electric locomotives	2	2	......
Number of persons employed	9,638	7,461	29.2
Salaries and wages	$13,419,003	$7,888,127	70.1
Primary horsepower, total	30,116	18,966	58.8
Kilowatt capacity of generators	18,200	14,550	25.1
Current generated, kilowatt-hours	23,021,695	22,895,276	0.6
Current purchased, kilowatt-hours	234,541,378	245,049,086	*4.3
Passengers carried††	484,084,796	555,286,203	*12.8
Revenue car mileage	69,214,150	68,966,244	0.4
Railway operations, revenues	$31,716,476	$22,204,776	42.8
Railway operations, expenses	$22,523,541	$13,387,865	68.2
Net revenues, railway operations	$9,192,935	$8,816,911	4.3
Auxiliary operations, revenues**	$375,655	$59,305	533.4
Auxiliary operations, expenses	$183,823	$48,183	281.5
Net revenues, auxiliary operations	$191,832	$11,122	1,624.8
Net operating revenues	$9,384,767	$8,828,033	6.3
Taxes assignable to railway operations	$3,054,252	$1,831,691	66.7
Operating income	$6,330,515	$6,996,342	*9.5
Non-operating income	$266,554	$269,212	*1.0
Gross income	$6,597,069	$7,265,554	*9.2
Interest and other deductions from gross income	$6,551,768	$6,342,569	3.3
Net income	$45,301	$922,985	*95.1

† Three companies with 27.86 miles of track discontinued operations prior to 1922.

‡ Includes 0.66 miles of track in 1922 and 1917 lying outside the state, but owned by companies within the state, and excludes 14.37 miles in both years operated in the state, but owned by companies outside the state.

†† In addition there were 10,279 passengers carried by six motor buses operated by electric railway companies in 1922.

** Chiefly revenues from electric light and power departments of electric railways.

Texas—**A slight increase occurred in track mileage, and there was a gain of 23.9 per cent in the number of passengers carried. Gross railway operating revenues amounted to $16,038,086 in 1922, an increase of 47.2 per cent as compared with 1917.**

	1922	1917	Per Cent of Increase, 1917–1922
Number of operating companies	†24	32	....
Miles of single track operated‡	966.01	940.41	2.7
Number of cars, all types	1,606	1,493	7.6
Number of electric locomotives	1	1	....
Number of persons employed	5,736	4,914	16.7
Salaries and wages	$7,286,684	$4,189,408	73.9
Primary horsepower, total	68,511	63,200	8.4
Kilowatt capacity of generators	49,732	46,871	6.1
Current generated, kilowatt-hours	171,734,012	119,510,988	43.7
Current purchased, kilowatt-hours	62,411,775	53,737,334	16.1
Passengers carried	229,165,045	184,912,268	23.9
Revenue car mileage	44,570,642	39,682,183	12.3
Railway operations, revenues	$16,038,086	$10,894,860	47.2
Railway operations, expenses	$11,241,975	$6,742,007	66.7
Net revenues, railway operations	$4,796,111	$4,152,853	15.5
Auxiliary operations, revenues**	$2,853,341	$1,876,360	52.1
Auxiliary operations, expenses	$1,489,218	$928,689	60.4
Net revenues, auxiliary operations	$1,364,123	$947,671	43.9
Net operating revenues	$6,160,234	$5,100,524	20.8
Taxes assignable to railway operations	$1,299,174	$748,239	73.6
Operating income	$4,861,060	$4,352,285	11.7
Non-operating income	$267,675	$234,476	14.2
Gross income	$5,128,735	$4,586,661	11.8
Interest and other deductions from gross income	$2,558,162	$2,182,321	17.2
Net income	$2,570,573	$2,404,340	6.9

† Six companies with 20.83 miles of track which reported in 1917 discontinued operations prior to 1922, and in addition 4 companies were merged with other companies.

‡ Excludes 8.62 miles in 1922, and 9.53 miles in 1917 operated in the state, but owned by companies outside the state.

** Chiefly revenues from electric light and power departments of electric railways.

Virginia.—**The figures show a decrease of 4.5 per cent in track mileage and a gain of 2.7 per cent in the number of passengers carried. Gross railway operating revenues amounted to $8,016,948, an increase of 24.4 per cent, but**

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*Indicates decrease.

owing to a more rapid increase in expenses, net income from all sources decreased by 31.2 per cent.

	1922	1917	Per Cent of Increase, 1917–1922
Number of operating companies	†14	16	.....
Miles of single track operated‡	555.02	581.35	*4.5
Number of cars, all types	1,141	1,015	12.4
Electric locomotives	4	1	.....
Number of persons employed	4,462	3,406	31.0
Salaries and wages	$5,243,754	$2,547,194	105.9
Primary horsepower, total	179,616	121,536	47.8
Kilowatt capacity of generators	126,812	85,289	48.7
Current generated, kilowatt-hours	314,336,019	210,427,025	49.4
Current purchased, kilowatt-hours	33,195,804	21,063,702	57.6
Passengers carried	139,049,282	135,411,909	2.7
Revenue car mileage	24,312,340	21,968,083	10.7
Railway operations, revenues	$8,016,948	$6,444,415	24.4
Railway operations, expenses	$6,792,444	$3,959,244	71.6
Net revenues, railway operations	$1,224,504	$2,485,171	*50.7
Auxiliary operations, revenues**	$7,402,022	$3,648,872	102.9
Auxiliary operations, expenses	$3,867,384	$1,455,805	165.7
Net revenues, auxiliary operations	$3,534,638	$2,193,067	61.2
Net operating revenues	$4,759,142	$4,678,238	1.7
Taxes assignable to railway operations	$986,298	$482,452	104.4
Operating income	$3,772,844	$4,195,786	*10.1
Non-operating income	$404,526	$257,743	56.9
Gross income	$4,177,370	$4,453,529	*6.2
Interest and other deductions from gross income	$2,899,097	$2,594,523	11.7
Net income	$1,278,273	$1,859,006	*31.2

† Reduction in companies due to consolidations and to the fact that one company discontinued operations prior to 1922.

‡ Includes 3,88 miles in 1922 and 4.69 miles in 1917 lying outside the state, but owned by companies within the state, and excludes 2.50 miles in 1922 and 4.02 miles in 1917 operated in the state, but owned by companies outside the state.

** Chiefly revenues from electric light and power departments of electric railways.

Oregon.—There was a slight increase in track mileage, and an increase of 5.8 per cent in the number of passengers carried. Gross railway operating revenues amounted to $7,400,750 in 1922 as compared with $4,999,601 in 1917, a gain of 48 per cent, and operating expenses increased 74.1 per cent.

	1922	1917	Per Cent of Increase 1917–1922
Number of operating companies	9	8	.....
Miles of single track operated†	605.16	596.23	1.5
Number of cars, all types	1,422	1,431	*0.6
Electric locomotives	19	22	.....
Number of persons employed	3,585	3,057	17.3
Salaries and wages	$5,610,433	$2,976,798	88.5
Primary horsepower, total	115,000	113,950	0.9
Kilowatt capacity of generators	85,630	64,880	32.0
Current generated, kilowatt-hours	323,645,100	218,086,315	48.4
Current purchased, kilowatt-hours	15,991,264	15,066,427	6.1
Passengers carried	97,246,645	91,926,694	5.8
Revenue car mileage	21,341,238	22,528,731	*5.3
Railway operations, revenues	$7,400,750	$4,999,601	48.0
Railway operations, expenses	$6,062,257	$3,481,723	74.1
Net revenues, railway operations	$1,338,493	$1,517,878	*11.8
Auxiliary operations, revenues**	$3,883,726	$2,102,832	84.7
Auxiliary operations, expenses	$1,490,986	$759,168	96.4
Net revenues, auxiliary operations	$2,392,740	$1,343,664	78.1
Net operating revenues	$3,731,233	$2,861,542	30.4
Taxes assignable to railway operations	$1,043,736	$693,211	50.6
Operating income	$2,687,497	$2,168,331	23.9
Non-operating income	$317,600	$184,711	71.9
Gross income	$3,005,097	$2,353,042	27.7
Interest and other deductions from gross income	$3,248,744	$2,981,620	9.0
Deficit	$243,647	$628,578	*61.2

* Includes 0.50 miles in 1922 and 0.09 miles in 1917 lying outside the state, but owned by companies within the state, and excludes 7.35 miles in 1922 and 6.99 miles in 1917 operated in the state, but owned by companies outside the state.

** Chiefly revenues from electric light and power departments of electric railways.

Maine.—The figures show a slight decrease in track mileage and a reduction of 10.1 per cent in the number of passengers carried. On the other hand railway operating revenues increased, owing chiefly to advances in fare rates, from $3,510,034 in 1917 to $4,836,396 in 1922, or 37.8 per cent, and net income showed a gain of 112.1 per cent.

	1922	1917	Per Cent of increase 1917–1922
Number of operating companies	15	16	......
Miles of single track†	571.56	577.00	*0.9
Number of cars, all types	672	820	*18.0
Electric locomotives	8	7	......
Number of persons employed	1,789	1,903	*6.0
Salaries and wages	$2,615,625	$1,665,721	57.0
Primary horsepower, total	56,556	45,548	24.2
Kilowatt capacity of generators	30,660	22,814	34.4
Current generated, kilowatt-hours	75,180,990	61,596,706	22.1
Current purchased, kilowatt-hours	47,887,491	40,673,687	17.7
Passengers carried	55,575,075	61,789,846	*10.1
Revenue car mileage	11,026,566	12,255,066	*10.0
Railway operations, revenues	$4,836,396	$3,510,034	37.8
Railway operations, expenses	$3,724,767	$2,618,746	42.2
Net revenue, railway operations	$1,111,629	$891,288	24.7
Auxiliary operations, revenues	$1,815,178	$1,271,187	42.8
Auxiliary operations, expenses	$776,900	$501,475	54.9
Net revenue, auxiliary operations	$1,038,278	$769,712	34.9
Net operating revenue	$2,149,907	$1,661,000	29.4
Taxes assignable to railway operations	$417,362	$198,524	110.2
Operating income	$1,732,545	$1,462,476	18.5
Nonoperating income	$215,496	$143,450	50.2
Gross income	$1,948,041	$1,605,926	21.3
Deductions from gross income	$1,140,658	$1,225,209	*6.9
Net income	$807,383	$380,717	112.1

†Includes in both years 5.48 miles of track lying outside of the state, but owned by companies within the state.

Vermont—The figures show not only a decrease of 8.1 per cent in track mileage, but also a loss of 20.5 per cent in the number of passengers carried. Gross railway operating revenues amounted to $602,196 in 1922, an increase of less than 1 per cent, as compared with 1917, while railway operating expenses increased 7.3 per cent, and net income 1.3 per cent.

	1922	1917	Per Cent of Increase, 1917–1922
Number of operating companies	†8	9	.....
Miles of single track operated‡	99.20	107.95	*8.1
Number of cars, all types	87	156	*44.2
Electric locomotives	5	....	.....
Number of employees	268	311	*13.8
Salaries and wages	$294,712	$259,205	13.7
Primary horsepower, total	2,800	8,394	*66.6
Kilowatt capacity of generators	2,150	7,277	*72.2
Current generated, kilowatt-hours	3,449,600	11,601,930	*70,3
Current purchased, kilowatt-hours	11,879,978	10,152,558	17.0
Passengers carried	7,372,195	9,268,385	*20.5
Revenue mileage	1,405,742	1,865,039	*24.6
Railway operations, revenues	$602,196	$596,983	0.9
Railway operations, expenses	$525,166	$489,663	7.3
Net revenues, railway operations	$77,030	$107,320	*28.2
Auxiliary operations, revenues**	$286,387	$229,586	24.7
Auxiliary operations, expenses	$189,896	$109,783	73.0
Net revenues, auxiliary operations	$96,491	$119,803	*19.5
Net operating revenues	$173,521	$227,123	*23.6
Taxes assignable to railway operations	$30,680	$34,684	*11.5
Operating income	$142,841	$192,439	*25.8
Non-operating income	$53,633	$48,489	10.6
Gross income	$196,474	$240,928	*18.5
Interest and other deductions from gross income	$160,116	$205,040	*21.9
Net income	$36,358	$35,888	1.3

† One company with 13.22 miles of track suspended operations prior to 1922.

‡ Includes 2.25 miles in 1922, and 2.86 miles in 1917 operated outside the state but owned by companies within the state, and excludes 20.45 miles in 1922 and 20.46 miles in 1917 operated in the state but owned by companies outside the state.

** Chiefly revenues from electric light and power departments of electric railways.

Massachusetts.—Track mileage decreased 12 per cent. This decrease is due to track reported as abandoned or idle in 1922. A decrease of 13.2 per cent is also shown in the number of passengers carried. Gross railway operating revenues amounted to $60,942,009 in 1922, an increase of 34.7 per cent as compared with 1917; operating expenses increased 30.3 per cent while net income made a gain of 222.8 per cent.

	1922	1917	Per Cent of increase, 1917–1922†
Number of operating companies	**31	39	.....
Miles of single track operated††	2,688.37	3,055.88	*12.0
Number of cars, all types	6,273	9,515	*34.1
Number of electric locomotives	5	6	.....
Number of persons employed	17,530	21,330	*17.8
Salaries and wages	$27,938,108	$21,236,219	31.6
Primary horsepower, total	303,863	333,390	*8.9
Kilowatt capacity of generators	224,539	233,619	*3.9
Current generated, kilowatt-hours	396,515,810	537,040,967	*26.2
Current purchased, kilowatt-hours	111,050,581	97,326,716	14.1
Passengers carried	§1,058,708,495	1,219,706,121	*13.2
Revenue car mileage	105,161,956	137,559,415	*23.6
Railway operations, revenues	¶$60,942,009	¶$45,239,116	34.7
Railway operations, expenses	$44,431,004	$34,097,107	30.3
Net operating revenues	$16,511,005	$11,142,009	48.2
Taxes assignable to railway operations	$2,636,552	$2,210,133	19.3
Operating income	$13,874,453	$8,931,876	55.3
Non-operating income	$770,176	$211,547	264.1
Gross income	$14,644,629	$9,143,423	60.2
Interest and other deductions from gross income	$9,845,285	$7,656,659	28.6
Net income	$4,799,344	$1,486,764	222.8

** Reduction due to companies which have discontinued operations.

†† Excludes 70.29 miles in 1922 and 110.93 miles in 1917 lying outside the state, but owned by companies within the state.

§ In addition there were 639,217 passengers carried by twelve motor buses operated by electric railway companies.

¶ Includes revenues from sale of electric current to the amount of $533,016 in 1922 and $578,283 in 1917.

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*Indicates decrease.

Association News & Discussions

Committee Appointments for 1923-1924, American and Affiliated Associations

THE committee appointments of the American Electric Railway Association and affiliated associations have been completed by President Britton I. Budd and the other presidents. The list printed herewith includes only the men who have accepted, and there will be a few additions to some of the committees as final acceptances are received.

American Association

Finance

J. H. Pardee, president The J. G. White Management Corporation, New York, N. Y., chairman.
R. P. Stevens, New York, N. Y.
J. G. Barry, Schenectady, N. Y.

Policy

J. N. Shannahan, president Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va., chairman.
J. P. Barnes, Louisville, Ky.
H. G. Bradlee, Boston, Mass.
C. D. Emmons, Baltimore, Md.
J. H. Hanna, Washington, D. C.
W. H. Sawyer, East St. Louis, Ill.
Paul Shoup, San Francisco, Cal.
H. D. Shute, East Pittsburgh, Pa.
L. S. Storrs, New Haven, Conn.
Robert I. Todd, Indianapolis, Ind.

Subjects and Meetings

F. R. Coates, Henry L. Doherty & Company, New York, N. Y., chairman.
Harry L. Brown, New York, N. Y.
Joseph K. Choate, New York, N. Y.
Harlow C. Clark, Newark, N. J.
F. W. Doolittle, New York, N. Y.
E. C. Faber, New York, N. Y.
George H. Harries, Chicago, Ill.
Cornell S. Hawley, Albany, N. Y.
W. H. Hyland, Gloversville, N. Y.
H. A. Johnson, Chicago, Ill.
C. W. Kellogg, Boston, Mass.
J. K. Punderford, New Haven, Conn.
A. S. Richey, Worcester, Mass.

Publicity

W. H. Sawyer, president East St. Louis & Suburban Railway, East St. Louis, Ill., chairman.
P. S. Arkwright, Atlanta, Ga.
Frank L. Blanchard, New York.
John S. Bleecker, Springfield, Ohio.
Frank R. Coates, New York, N. Y.
P. H. Gadsden, Philadelphia, Pa.
L. E. Gould, Chicago, Ill.
Luke Grant, Chicago, Ill.
J. P. Griffin, Dallas, Tex.
H. M. Lytle, Chicago, Ill.
J. C. McQuiston, East Pittsburgh.
Martin P. Rice, Schenectady, N. Y.
L. S. Storrs, New Haven, Conn.
E. M. Walker, Schenectady, N. Y.

Publications

L. S. Storrs, president The Connecticut Company, New Haven, Conn., chairman.
J. P. Barnes, Louisville, Ky.
F. G. Buffe, Kansas City, Mo.
Harlow C. Clark, Newark, N. J.
E. C. Faber, New York, N. Y.
M. B. Lambert, East Pittsburgh, Pa.
J. N. McDonald, New York, N. Y.
M. McCants, San Francisco, Cal.
E. M. Walker, Schenectady, N. Y.

Company and Associate Membership

R. P. Stevens, president Republic Railway & Light Company, New York, N. Y., chairman.
R. F. Carbutt, New York, N. Y.
John A. Dewhurst, Philadelphia, Pa.
Albert Flor, New York, N. Y.
H. B. Flowers, New Orleans, La.
L. E. Gould, Chicago, Ill.
C. W. Kellogg, Boston, Mass.
T. A. Kenney, New York, N. Y.
George R. Lyman, New York, N. Y.
C. E. Morgan, Brooklyn, N. Y.
R. Shaddelee, Grand Rapids, Mich.
K. A. Simmon, East Pittsburgh, Pa.
E. M. Walker, Schenectady, N. Y.
E. P. Waller, Schenectady, N. Y.

Community Section, Company Section and Individual Membership

C. E. Morgan, vice-president and general manager Brooklyn City Railroad, Brooklyn, N. Y., chairman.
C. P. Billings, Pittsburgh, Pa.
L. C. Datz, Memphis, Tenn.
C. R. Ellicott, New York, N. Y.
W. H. Hyland, Gloversville, N. Y.
H. A. Johnson, Chicago, Ill.
J. K. Punderford, New Haven, Conn.
Martin Schreiber, Camden, N. J.
J. E. Wayne, York, Pa.
E. M. White, Binghamton, N. Y.

Co-operation with State and Sectional Associations

J. P. Barnes, president, Louisville Railway, Louisville, Ky., chairman.
John S. Bleecker, Springfield, Ohio.
F. G. Buffe, Kansas City, Mo.
F. C. Chambers, Des Moines, Iowa.
J. C. Chestnut, McAlester, Okla.
J. F. Collins, Jackson, Mich.
F. B. Culley, Augusta, Ga.
P. H. Gadsden, Philadelphia, Pa.
L. H. Palmer, Baltimore, Md.
C. E. Morgan, Brooklyn, N. Y.
A. B. Paterson, New Orleans, La.
A. M. Patten, Topeka, Kan.
T. H. Tutwiler, Memphis, Tenn.
C. V. Wood, Springfield, Mass.

Co-operation with Manufacturers

E. F. Wickwire, secretary the Ohio Brass Company, Mansfield, Ohio, chairman.
George O. A. Barnes, New York, N. Y.
W. C. Bell, Richmond, Va.
W. D. Blatz, Bridgeport, Conn.
W. H. Boyce, New Brighton, Pa.
F. R. Coates, New York, N. Y.
C. R. Ellicott, New York, N. Y.
C. D. Emmons, Baltimore, Md.
Edwin C. Faber, New York, N. Y.
H. H. Lloyd, Indianapolis, Ind.
J. C. McQuiston, East Pittsburgh.
E. B. Meissner, St. Louis, Mo.
George R. Rowland, New York, N. Y.
W. S. Stackpole, Newark, N. J.
E. M. Walker, Schenectady, N. Y.
E. P. Waller, Schenectady, N. Y.
James Ashton Greig, Chicago, Ill.

Education

Edward Dana, general manager Boston Elevated Railway, Boston, Mass., chairman.
Edward J. Blair, Chicago, Ill.
C. F. Crane, Harrisburg, Pa.
C. B. Fairchild, Philadelphia, Pa.
R. M. Howard, Winona, Minn.
Myles B. Lambert, East Pittsburgh.
M. McCants, San Francisco, Cal.
James McFall, Pittsburgh, Pa.
C. E. Morgan, Brooklyn, N. Y.
H. H. Norris, New York, N. Y.
J. V. Sullivan, Chicago, Ill.

Mail Pay

L. H. Palmer, general manager United Railways & Electric Company, Baltimore, Md., chairman.
Gordon Campbell, York, Pa.
G. K. Jeffries, Indianapolis, Ind.
R. A. Leussler, Omaha, Neb.
Samuel Riddle, Louisville, Ky.
W. S. Rodger, Highland Park, Mich.
H. B. Weatherwax, Albany, N. Y.

Committee to Co-operate with the National Safety Council

J. P. Barnes, president Louisville Railway, Louisville, Ky., chairman.
H. O. Allison, New Brighton, Pa.
Charles W. Chase, Gary, Ind.

Uniform Regulatory Laws

A. W. Brady, president, Union Traction Company of Indiana, Anderson, Ind., chairman.
Wm. Chamberlain, Cedar Rapids, Iowa.
E. J. Dickson, Providence, R. I.
George E. Hamilton, Washington, D. G.
R. D. Hood, Haverhill, Mass.
T. W. Passailaigue, Charleston, S. C.
Alfred Sweeney, Lewiston, Me.

C. L. S. Tingley, Philadelphia, Pa.
H. B. Weatherwax, Albany, N. Y.

GENERAL ARRANGEMENTS MIDYEAR DINNER

W. H. Sawyer, president East St. Louis & Suburban Railway, East St. Louis, Ill., chairman.

E. B. Meissner, St. Louis, Mo., vice-chairman.

James P. Barnes, Louisville, Ky.
F. G. Buffe, Kansas City, Mo.
Edward Dana, Boston, Mass.
C. R. Ellicott, New York, N. Y.
H. B. Flowers, New Or'eans, La.
L. E. Gould, Chicago, Ill.
J. H. Hanna, Washington, D. C.
H. J. Kenfield, Chicago, Ill.
M. B. Lambert, East Pittsburgh, Pa.
R. V. Prather, Springfield, Ill.
Harry Reid, Indianapolis, Ind.
E. P. Waller, Schenectady, N. Y.

NATIONAL RELATIONS

Charles L. Henry, president Indianapolis & Cincinnati Traction Company, Indianapolis. Ind., chairman.

W. A. Baehr, Chicago, Ill.
H. G. Bradlee, Boston, Mass.
Ralph R. Bradley, Chicago, Ill.
Arthur W. Brady, Anderson, Ind.
C. D. Cass, Waterloo, Iowa.
C. R. Ellicott, New York, N. Y.
P. H. Gadsden, Philadelphia, Pa.
C. E. Groesbeck, New York. N. Y.
J. H. Hanna, Washington, D. C.
W. H. Sawyer, East St. Louis, Ill.

INDETERMINATE FRANCHISE

Edwin Gruhl, vice-president and general manager, North American Company, New York, N. Y., chairman.

Walter A. Draper, Cincinnati. Ohio.
Edwin Duffey, Cortland, N. Y.
H. L. Geisse, Wausau, Wis.
F. C. Hamilton, New York, N. Y.
R. B. Stearns, Boston, Mass.

INSURANCE

John T. Staub, treasurer United Railways & Electric Company, Baltimore, Md., chairman.

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Granville H. Bourne, New York, N. Y.
N. H. Daniels, Boston, Mass.
B. J. Denman, Davenport, Iowa.
Charles E. Fahrney, Ottumwa, Iowa.
F. M. Hamilton, Chicago, Ill.
A. D. Knox, New Haven, Conn.
John H. Moran, Boston, Mass.
C. E. Morgan, Brooklyn, N. Y.
Charles B. Scott, Chicago, Ill.
Paul E. Wilson, Cleveland, Ohio.

RELATIONSHIP WITH THE MOTOR VEHICLE INDUSTRY

L. S. Storrs, president, The Connecticut Company, New Haven, Conn., chairman.

J. G. Barry, Schenectady, N. Y.
A. W. Brady, Anderson, Ind.
F. R. Coates, Toledo, Ohio.
C. D. Emmons, Baltimore, Md.
R. P. Stevens, New York, N. Y.

RAPID TRANSIT

Wm. S. Menden, president Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., chairman.

B. J. Fallon, Chicago, Ill.
R. F. Kelker, Jr., Chicago, Ill.
L. H. Palmer, Baltimore, Md.
F. R. Phillips, Pittsburgh, Pa.

SPECIAL TAXES

W. H. Maltbie, special counsel United Railways & Electric Company, Baltimore, Md., chairman.

F. C. Chambers, Des Moines, Iowa.
A. T. Davison, New York, N. Y.
Edwin Gruhl, New York, N. Y.
A. G. Neal, Washington, D. C.
H. B. Sawyer, Boston, Mass.

VALUATION

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F. C. Hamilton, New York, N. Y., vice-chairman.

J, P. Barnes, Louisville, Ky.
E. J. Bechtel, New York, N. Y.
H. M. Brinckerhoff, New York, N. Y.
H. A. Clark, New York, N. Y.
Thomas Conway, Jr., Philadelphia.
W, Findlay Downs, Philadelphia, Pa.
J. A. Emery, New York, N. Y.
C. W. Gillespie, New York, N. Y.
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L. R. Nash, Boston, Mass.
A. S. Richey, Worcester, Mass.
W. H. Sawyer, East St. Louis, Ill.
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W. B. Tuttle, San Antonio, Tex.
E. D. Uhlendorf, Chicago, Ill.

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Britton I. Budd, president Chicago Elevated Railroads, Chicago, Ill., and president American Electric Railway Association, chairman.

J. N. Shannahan, Hampton, Va.
James H. McGraw, New York, N. Y.

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C. P. Billings, Pittsburgh. Pa.
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A. D. Mackie, Springfield, Ill.
A. T. Perkins, St. Louis, Mo.
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REPRESENTATIVES OF THE ASSOCIATION ON OTHER NATIONAL ORGANIZATIONS

National Transportation Institute:
J. H. Hanna, vice-president The Capital Traction Company, Washington, D. C.

Committee on Customer Ownership of the National Electric Light Association:
R. P. Stevens, president Republic Railway & Light Company, New York, N. Y.

National Councillor of the United States Chamber of Commerce:
J. N. Shannahan, president Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va.

Substitute National Councillor:
J. H. Hanna, vice-president Capital Traction Company, Washington, D. C.

National Industrial Conference Board:
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J. H. Pardee, president The J. G. White Management Corporation, New York, N. Y.

American Committee on Electrolysis:
W. J. Harvie, vice-president Auburn & Syracuse Electric Railway, Auburn, N. Y.

National Committee for National Defense:
Edward J. Blair, assistant to the president, Chicago Elevated Railroads, Chicago, Ill.

National Joint Committee of Public Utility Associations:
Randall Morgan, vice-president United Gas Improvement Company, Philadelphia, Pa., chairman.
Britton I. Budd, Chicago, Ill.
J. K. Choate, New York, N. Y.
F. R. Coates, New York, N. Y.
E. C. Faber, New York, N. Y.
P. H. Gadsden, Philadelphia, Pa.
L. S. Storrs, New Haven, Conn.
Robert I. Todd, Indianapolis, Ind.
J. W. Welsh, New York, N. Y.

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W. F. Ham, Washington, D. C.
H. L. Wilson, Boston, Mass.
Percy S. Young, Newark, N. J.

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Wallace L. Davis, auditor Lehigh Valley Transit Company, Allentown, Pa., chairman.

B. W. Fernald, Oakland, Cal.
C. S. Mitchell, Pittsburgh, Pa.

RELATIONS WITH OTHER ASSOCIATIONS

M. W. Glover, general auditor West Penn Railways, Pittsburgh, Pa., chairman.

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L. T. Hixson, Indianapolis, Ind.
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Claims Association

ACCIDENT PREVENTION

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E. L. Lindemuth, Wilkes-Barre, Pa.
F. W. Melford, Richmond, Va.
Allison J. Van Brunt, Newark, N. J.

EMPLOYMENT

W. B. Getchell, claim agent Central Maine Power Company, Augusta, Me., chairman.

Bert C. Wood, Youngstown, O.

Claims Department Aspects of Motor Bus Operation

G. T. Hellmuth, claims attorney Chicago, North Shore & Milwaukee Railroad, Chicago, Ill., chairman.
D. M. Finch, Des Moines, Ia.
Carl L. Young, Milwaukee, Wis.

Resolutions

W. M. Tichenor, claim agent Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., chairman.
W. H. Renaud, Jr., New Orleans, La.

Subjects

L. F. Wynne, general claim agent Georgia Railway & Power Company, Atlanta, Ga., chairman.
John J. Reynolds, Boston, Mass.

Medical and Surgical Committee

Dr. Hart E. Fisher, chief surgeon Chicago Elevated Railroads, Chicago, Ill., chairman.

Engineering Association

Standards

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C. C. Beck, Mansfield, Ohio.
J. A. Brooks, Philadelphia, Pa.
L. C. Datz, Memphis, Tenn.
W. G. Gove, Brooklyn, N. Y.
C. G. Keen, Philadelphia, Pa.
C. S. Kimball, Washington, D. C.
John Lindall, Boston, Mass.
F. R. Phillips, Pittsburgh, Pa.
N. W. Storer, East Pittsburgh, Pa.
N. B. Trist, Pittsburgh, Pa.
C. H. Clark, Cleveland, Ohio.

Buildings and Structures

N. E. Drexler, chief engineer Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va., chairman.
B. R. Brown, Dallas, Tex.
E. D. Eckroad, Akron, Ohio.
John R. McKay, Fort Wayne, Ind.
Judson Zimmer, Gloversville, N. Y.
C. H. Clark, Cleveland, Ohio, sponsor.

Revision of Car and Carhouse Wiring Rules

H. H. Adams, superintendent shops and equipment, Chicago Surface Lines, Chicago, Ill., chairman.
A. T. Clark, Baltimore, Md.
C. G. Keen, Philadelphia, Pa.
John Lindall, Boston, Mass.
P. V. C. See, Akron, Ohio.

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Clifford A. Elliott, Los Angeles, Cal.
Herbert Jackson, Washington, D. C.
Charles R. Harte, New Haven, Conn., sponsor.

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R. S. Bull, Pittsburgh, Pa.
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J. M. Hipple, East Pittsburgh, Pa.
J. H. Lucas, Milwaukee, Wis.
A. D. McWhorter, Memphis, Tenn.
J. F. Miller, Pittsburgh, Pa.
M. O'Brien, St. Louis, Mo.
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E. S. Sawtelle, Cincinnati, Ohio.
P. V. C. See, Akron, Ohio.
Ralston B. Smyth, Boston, Mass.
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W. G. Stuck, Lexington, Ky.
J. M. Yount, San Francisco, Cal.
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J. L. Gould, New York, N. Y.
Daniel Durie, Connellsville, Pa., sponsor.

Heavy Electric Traction

John C. Davidson, engineer electric traction, Norfolk & Western Railway, Bluefield, W. Va., chairman.
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H. F. Brown, New Haven, Conn.
Morris Buck, New York, N. Y.
H. W. Cope, East Pittsburgh, Pa.
A. H. Daus, Chicago, Ill.
J. H. Davis, Baltimore, Md.
J. V. B. Duer, Altoona, Pa.
Norman Litchfield, New York, N. Y.
John J. Sinclair, Brooklyn, N. Y.
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Individual Membership

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W. E. Bryan, St. Louis, Mo., vice-chairman.
H. E. Davis, Utica, N. Y.
F. C. Hanker, East Pittsburgh, Pa.
G. H. Kelsay, Cleveland, Ohio.
H. A. Kidder, New York, N. Y.
F. W. Peters, Schenectady, N. Y.
G. W. Saathoff, New York, N. Y.
L. J. Turley, Los Angeles, Cal.
R. L. Weber, Kansas City, Mo.
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S. H. Anderson, Los Angeles, Cal.
Leslie E. Delf, Fort Worth, Tex.
Ralph W. Eaton, Providence, R. I.
D. D. Ewing, Lafayette, Ind.
Charles Gilman, New York, N. Y.
C. L. Hancock New York, N. Y.
H. D. Hawks, Chicago, Ill.
C. J. Hixson, Schenectady, N. Y.
Adrian Hughes, Jr., Baltimore, Md.
John Leisenring, Springfield, Ill.
F. M. McVittie, Rochester, N. Y.
J. F. Neild, Toronto, Ont.
H. A. Pharo, Pittsburgh, Pa.
Walter J. Quinn, New York, N. Y.
W. Schaake, East Pittsburgh, Pa.
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F. J. White, New York, N. Y.
M. B. Rosevear, Newark, N. J., sponsor.

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J. F. Fleming, Washington, D. C.
C. A. Harris, Pittsburgh, Pa.
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C. Thorburn, Los Angeles, Cal.
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Unification of Car Design

H. H. Adams, superintendent of shops and equipment Chicago Surface Lines, Chicago, Ill., chairman.
J. A. Brooks, Philadelphia, Pa.
Charles Gordon, Chicago, Ill.
W. F. Graves, Charleston, W. Va.
J. W. Hulme, New York, N. Y.
G. L. Kippenberger, St. Louis, Mo.
John Lindall, Boston, Mass.
Victor Willoughby, New York, N. Y.
R. H. Dalgleish, Washington, D. C.

Way Matters

H. H. George, engineer maintenance of way Public Service Railway, Newark, N. J., chairman.
E. M. T. Ryder, New York, N. Y., vice-chairman.
C. A. Alden, Steelton, Pa.
V. Angerer, Easton, Pa.
S. Clay Baker, East St. Louis, Ill.
W. R. Dunham, Detroit, Mich.
E. B. Entwisle, Johnstown, Pa.
G. C. Estill, New Orleans, La.
R. B. Fisher, Harvey, Ill.
Chester F. Gailor, New York, N. Y.
A. E. Harvey, Kansas City, Mo.
J. H. Haylow, Memphis, Tenn.
J. S. Hyatt, Highwood, Ill.
B. P. Legare, San Francisco, Cal.
A. T. Spencer, Toronto, Ont.
Francis Tingley, Upper Darby, Pa.
J. B. Tinnon, Joliet, Ill.
Claude L. Van Auken, Chicago, Ill.
W. W. Wysor, Baltimore, Md.
R. C. Cram, Brooklyn, N. Y., sponsor.

Wood Preservation

A. P. Way, electrical engineer American Electric Power Company, Philadelphia, Pa., chairman.
C. A. Smith, Atlanta, Ga., vice-chairman.
M. J. Curtin, Boston, Mass.
J. L. Fritsch, Pittsburgh, Pa.
W. H. Fulweiler, Philadelphia, Pa.

Ernest F. Hartman, New York, N. Y.
W. L. Harwood, Springfield, Mass.
E. L. Morier, New York, N. Y.
M. B. Rosevear, Newark, N. J., sponsor.

Air Reservoir Specifications

R. H. Dalgleish, chief engineer the Capital Traction Company, Washington, D. C., chairman.
C. A. Ives, Erie, Pa.
J. A. Leeper, Pittsburgh, Pa.
J. S. McWhirter, New York, N. Y.

Automatic Substations

W. E. Bryan, superintendent of power the United Railways of St. Louis, St. Louis, Mo., chairman.
C. H. Jones, Chicago, Ill., vice-chairman.
L. D. Bale, Cleveland, Ohio.
C. A. Butcher, East Pittsburgh, Pa.
Adrian Hughes, Jr., Baltimore, Md.
F. W. Peters, Schenectady, N. Y.
Ralph H. Rice, Chicago, Ill.
E. H. Scofield, Minneapolis, Minn., sponsor.

Unit Method of Voting on Standards

C. S. Kimball, engineer way and structures, Washington Railway & Electric Company, Washington, D. C., chairman.
H. H. Adams, Chicago, Ill.
C. H. Clark, Cleveland, Ohio.
W. J. Harvie, Auburn, N. Y.

Transportation and Traffic Association

Accident Prevention

Charles W. Chase, president Gary Street Railway, Gary, Ind., chairman.
M. B. Bridges, Chicago, Ill.
C. H. Evenson, Chicago, Ill.
James Harmon, Indianapolis, Ind.
S. B. Ireland, St. Joseph, Mo.
A. W. Koehler, Rochester, N. Y.
D. E. Parsons, East St. Louis, Ill.
W. R. Phipps, Meridian, Miss.
R. M. Reade, Quebec, Que.
E. M. Walker, Schenectady, N. Y., sponsor.

Development of New Business

F. W. Shappert, traffic manager Chicago, North Shore & Milwaukee Railroad, Chicago, Ill., chairman.
Frank L. Butler, Atlanta, Ga.
John A. Dewhurst, Philadelphia, Pa.
S. W. Greenland, Fort Wayne, Ind.
James P. Griffin, Dallas, Tex.
H. G. Monger, Milwaukee, Wis.
F. D. Norveil, Anderson, Ind.
C. D. Smith, New Brighton, Pa.
Bert Weedon, Indianapolis, Ind.
W. H. Harton, Covington, Ky.
Robert P. Woods, Kansas City, Mo.
Samuel Riddle, Louisville, Ky., sponsor.

Relief of Traffic Congestion

Paul E. Wilson, secretary Cleveland Railway, Cleveland, Ohio, chairman.
G. B. Anderson, Los Angeles, Cal.
H. O. Butler, St. Louis, Mo.
D. L. Fennell, Kansas City, Mo.
M. McCants, San Francisco, Cal.
W. H. Maltbie, Baltimore, Md.
James Smith, Boston, Mass.
W. E. Thompson, New York, N. Y.
J. V. Sullivan, Chicago, Ill., sponsor.

Trackless Vehicle Operation

W. J. Flickinger, assistant to the president The Connecticut Company, New Haven, Conn., chairman.
B. W. Arnold, Oshkosh, Wis.
V. E. Keenan, Providence, R. I.
J. B. Stewart, Jr., Youngstown, Ohio.
Edward Dana, Boston, Mass., sponsor.

Mail Pay Hearing

TESTIMONY was taken last week in the railway mail pay case before Examiner Mullen of the Interstate Commerce Commission, I. C. C. Docket No. 10227, consuming four full days, Nov. 19 to 22. Joseph Stewart, special assistant to the Attorney General was in charge of the commission for the Post Office Department, and W. H. Maltbie, counsel for the committee on mail pay, American Electric Railway Association was in charge of the case for the railways.

C. W. Cornell of counsel for the Pacific Electric Railway Company, and F. E. Loucks, a special accountant for that company were in attendance and presented some evidence for their road. The witnesses put on by the mail pay committee were Prof. A. S. Richey, Worcester, Mass., Dr. Thomas Conway, Jr., Philadelphia, and Joseph A. Stoll, superintendent traffic, A. T. Clark, superintendent rolling stock and shops, and John B. Duvall, assistant superintendent of transportation of the United Railways and Electric Company of Baltimore.

After finishing the four-day session during which some fifty exhibits had been filed, the examiner set March 1 as the final date for filing of briefs. After the briefs have been filed, the commission, it is expected, will set a date for oral argument and will thereafter take the case under advisement for a decision.

Companies Which Made Presentations for Coffin Prize

LETTERS of acknowledgment and commendation are being sent by the Executive Committee to the railway companies which made presentations to the Charles A. Coffin prize committee of the American Electric Railway Association, in accord with the resolution passed at the meeting of the executive committee on Nov. 16. The companies which submitted briefs follow in alphabetical order:

Chicago, North Shore & Milwaukee Railroad, Highwood, Ill.
Colorado Springs & Interurban Railway, Colorado Springs, Col.
East St. Louis & Suburban Railway and East St. Louis Railway, East St. Louis, Ill.
El Paso Electric Railway, El Paso, Tex.
Holyoke Street Railway, Holyoke, Mass.
Interstate Public Service Company, Indianapolis, Ind.
Kansas City Railways, Kansas City, Mo.
Kentucky Traction & Terminal Company, Lexington, Ky.
Los Angeles Railway, Los Angeles, Cal.
Milwaukee Electric Railway & Light Company, Milwaukee, Wis.
Monongahela-West Penn Public Service Company, Fairmont, W. Va.
Northern Texas Traction Company, Fort Worth, Tex.
San Diego Electric Railway, San Diego, Cal.
San Francisco-Oakland Terminal Railways, Oakland, Cal.
Spokane United Railways, Spokane, Wash.
Union Street Railway, New Bedford, Mass.
Washington Railway & Electric Company, Washington, D. C.

News of Other Associations

Program Announced for New England Club Meeting

THE December meeting of the New England Street Railway Club will be held at the Copley Plaza Hotel, Boston, Mass., on Thursday, Dec. 6. The afternoon meeting, called to order at 3 o'clock, will be devoted to a series of fifteen-minute papers on the following subjects: "Snow Handling Equipment" (with moving pictures), by Charles F. Reuter, engineer Eastern Tractors Company; "Results Obtained in Track Work by the Use of Mechanical Devices," by F. B. Walker, engineer Eastern Massachusetts Street Railway; "Electric Freight Haulage," by P. H. Stoffel, Westinghouse Electric & Manufacturing Company.

The evening meeting will be devoted to a talk, illustrated by slide and moving pictures on "Maine, the Sportsman's Paradise," by Eugene S. Jones, photographer of the Boston & Maine Railroad. A dinner will be served at 6.15.

C.E.R.A. Annual Meeting in Indianapolis Jan. 24 and 25

THE Annual Meeting of the Central Electric Railway Association will be held at Hotel Lincoln, Indianapolis, Ind., Thursday and Friday, Jan. 24 and 25, 1924. There will be a dinner on the evening of Jan. 24.

Relief from Paving Burden Urged

THERE is no longer any good reason why a railway should pay for installation of original pavements or for complete repavements, declared R. C. Cram in a paper read before the

National Municipal Research Council held at the City Club, Washington, D. C., on Nov. 16. This is so because the presence of tracks has nothing to do with the question of the need for street pavements. The only requirement as to railway pavements may be one relating to the extent the railways, through operation of cars, may cause deterioration in the pavement, and this should be limited strictly to repairs needed in consequence of the existence and use of the tracks.

Some interesting data were presented by Mr. Cram tending to show that paving maintenance costs are substantially the same as on any part of a railway street. These data seem to support the view that railway streets, being main arteries of travel, receive greater traffic. It should logically be expected that main traveled streets will require more extensive paving repairs than streets of lesser importance.

Dean Cooley Honored

UNIVERSITY presidents, judges, engineers and men prominent in political life, gathered at a dinner in Detroit on November 23, paid tribute to Mortimer E. Cooley, dean of the engineering schools of the University of Michigan and retiring president of the Federated American Engineering Societies. Dean Cooley, at the end of nearly half a century of effort, was extolled as an engineer and educator of distinguished public service.

The dinner was given under the auspices of the Detroit Engineering Society and the local section of the national engineering societies.

Those at the speakers' table included Supreme Court Justice Robert F. Thompson, Canandaigua, N. Y.; Ira N. Hollis, president of Worcester Polytechnic Institute and classmate of Dean Cooley at the United States Naval Academy; Admiral John K. Robinson, representing Secretary of the Navy Edwin Denby; Dr. Marion L. Burton, president of the University of Michigan; Philip N. Moore, St. Louis, vice-president of the Federated American Engineering Societies; F. Paul Anderson, dean of engineering of the University of Kentucky; Chase S. Osborn, L. W. Wallace, executive secretary of the Federated American Engineering Societies, Washington; Truman H. Newberry, Walter S. Russel, Charles F. Loweth, president of the American Society of Civil Engineers; N. S. Shaw, president of Michigan Agricultural College; and John L. Herrington, president of the American Society of Mechanical Engineers.

Several speakers brought out reminiscences of Dean Cooley's days at Annapolis and later as a naval officer. Others dwelt upon his services to education and to engineering, praising "his high character, his big-heartedness and geniality, his noble aspirations and his love for his fellowmen." President Burton paid a tribute to the work of Dean Cooley in his long connection with the University of Michigan.

Dean Cooley has been granted leave of absence for the second semester of the present academic year by the University of Michigan. He will spend this period on a farm recently purchased by him near Canandaigua, N. Y. His successor as president of the F. A. E. S. will be elected at the annual meeting of the American Engineering Council early in January.

Kentucky Utilities Association to Meet at Louisville

THE annual meeting of the Kentucky Association of Public Utilities will be held at Louisville on Dec. 13 and 14. The session will open with a dinner for the delegates on Thursday evening, with the technical sessions on Friday.

Aims and Plan of the National Transportation Institute

THE National Transportation Institute is a comparatively new national organization, whose object is to change the attitude of the public at large toward transportation in general. It comprises all industry and is governed by a board of directors made up by groups, such as agricultural, railway, public utility, etc., consisting of fifty-two directors of whom twenty-six have been elected at this time. It is a continuing board with certain expirations each year, so that the chance for control by any group is thought to be remote. Membership in the institute may be had by practically any company or organization at $100 per membership, and any organization may take out as many memberships as it desires, having one vote for each membership.

The institute consists of a research council and a publicity bureau. The research council will comprise a group of men particularly fitted by experience to develop the facts about the various transportation agencies—steam railroads, electric railroads, motor buses, water transportation, etc. The members of the council are to be selected by the process of the president nominating three men, from among whom the directors will elect one. This again is designed to avoid any possible control of the organization by one group.

The representatives of the institute have conceived the need for this organization because there is at present no comprehensive study of transportation going on by a disinterested impartial body. The absence of this has afforded opportunity for radical elements to attack the railways and make extensive use of false information. The key to the institute plan is the research council, which is to be composed of men of accepted reputation who will be given a certain amount of money and set aside where they will be free from responsibility to any organization or group. They will get the facts and then these facts will be put out to the public through the publicity bureau.

It is expected that the most effective work of the institute will come later when it has sufficiently progressed in its organization and finances to permit of the employment of men to give their entire time to speaking on transportation problems. The idea is that there may ultimately be the equivalent of one speaker for every state. It is thought also that addresses of this kind will produce much publicity in the newspapers. Further, the newspapers, knowing that they can apply to the Institute for information upon which they can depend as accurate and impartial, will have no reason to publish misinformation.

Another phase of the work is educational in nature. It is claimed that the proportion of children who never go so far in their schooling as high school is so great that as they grow up they numerically control the popular vote. This great body of children at present receives practically nothing in the way of information as to the influence of transportation, coal, or any of the other essentials on their lives. The Institute plans to bring to the school children the effect of various businesses on the child's life.

The institute is now publishing a twelve-page leaflet monthly, but plans ultimately to have a magazine of considerable importance as a medium for putting out the results of its efforts. It is planned also to use motion picture lectures, in which it can bring out what transportation, or the lack of it, means to a country.

The Institute has no relation with the United States Chamber of Commerce or any other body. It is an independent body in which it is considered essential that all business interests participate. On the question of municipal or government ownership, the policy of the institute is not stated, as the idea of creating the institute as an entirely impartial body precluded any predetermination of policy on any matter. If the reports of the research council were not unanimously concurred in by the council, there is nothing in the present organization of the body to prevent both the majority and minority reports being made public, although it would obviously be the endeavor to reach unanimous agreement.

This is the first time that all business interests have joined together in a movement of this kind. The institute earnestly desires that the electric railways support and take part in its activities. The American Electric Railway Association has not as yet determined what its action shall be with respect to endorsement of the Institute, but has the matter under advisement at the present time.

Maintenance of Equipment

Signal System Shows Steam Pressure

THE Wilmington, N. C., power plant of the Tidewater Power Company has a signal system in the generator and boiler rooms which shows the steam pressure carried in the main header. The scheme was developed by George Avant, combustion engineer for the company, and has been in successful operation for over two years. The Tidewater Power Company operates an interurban line between Wilmington and Wrightsville Beach.

Four different colored lights are arranged on a small board suspended half way between the floor and ceiling, so that they may be seen from any point in the generator room. The circuits for the lights are opened and closed by three steam gages, which were fitted with contacts so as to make electrical connections whenever the steam pressure reaches specific values. If the steam pressure falls below 140 lb., a white light will burn and continue to burn until the pressure rises above this value.

All lights are out between pressures of 140 lb. and 150 lb. At the latter pressure a red lamp is lighted, and at 155 lb. a blue lamp comes on in addition to the red lamp, and if the pressure rises to 158 lb. a green lamp also lights and a Klaxon horn is sounded. As the safety valves are set for 163 lb., this arrangement gives ample warning and helps to provide even boiler operation. A similar set of signals is installed in the boiler room.

Blueprints of Repair Parts Save Mistakes

By O. A. Norene

Assistant Master Mechanic Omaha & Council Bluffs Street Railway

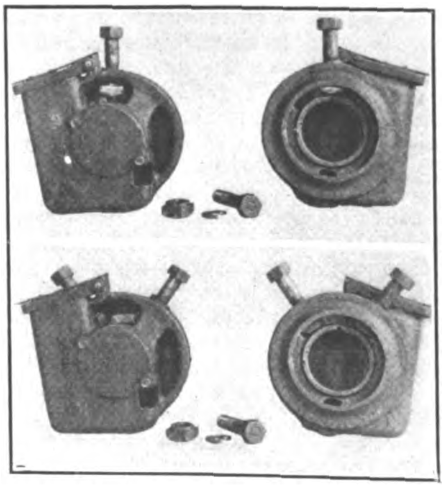
A BOOK of blueprints of standard repair parts is furnished to the store department and the shop and carhouse foremen of the Omaha & Council Bluffs Street Railway. These prints show standard elliptic and coil springs, brake levers and pins, brake slack adjusters and brake riggings, sizes and types of motor bolts, etc., for different types of equipments; also spring tension on different types of brush-holders and sizes and types of carbons used on different types of motors. By referring to these prints no excuse can be given if wrong material is used.

Through-Bolt Housings Save Motor Trouble

By James A. Duffy

Superintendent of Equipment Monongahela-West Penn Public Service Company

WE HAVE had on our property for a number of years several Westinghouse No. 306 motors. These are of the split-frame type, with housings or heads that originally were held to the upper half of the motor frame casting by two radial tap bolts. This arrangement holds the armature to the upper half of the shell when the lower half is swung down or removed for making repairs to the motor under the car. In addition these bolts help to keep the housing in place.



Application of Through Bolts to Motor Housings. Above, With One Vertical Bolt; Below, With Two Radial Bolts

It was our experience that these housings would work loose in service and tend to wear at the seats, and at the same time the threaded holes in the housings would become badly worn. In many instances the threads in the housings were entirely worn out and the bolts would not hold, thus making it necessary to replace these worn housings by new ones.

In making replacements on some of these housings, a new through-bolt type of housing has been adopted. This was developed for these motors by the Westinghouse company. The results have been very satisfactory. The new housing has two bolts, each of which screws into a nut and clamps the housing to the motor shell through a draft on the nut. This type of housing is shown in the illustrations. They are made for us from either malleable iron or cast steel, so that they are strong and durable.

The through bolts holding them in place are heat treated, which makes them strong and fatigue resisting. If the bolts wear at the threads they can be replaced readily by new ones at a small expense. If the threads rust, the nut can be cut off and the bolt is easily removed.

There are no threads in the housings to become worn out, so that a better fit is obtained throughout the life of the motor.

These housings can be obtained ¼ in. oversize on the diameter. This is of particular advantage for fitting in frames that have worn. These housings have three bolt holes so that they can be used not only on the No. 306 motor, which has two radial bolts, but on the old No. 101 motor using a single vertical bolt.

Since using these through-bolt type housings, we have eliminated all housing trouble. We have never had a through bolt get loose. In fact, it was one of the improvements that almost eliminated all motor troubles on the No. 306 motor on this property.

Brass Foundry Aids Repairs

THE Illinois Traction System has a brass foundry in connection with its Decatur shops and four men turn out from twelve to fourteen tons of brass castings per month. This is found of great assistance in producing such parts as brush-holders, grab-handle sockets, sash locks, window lifts and other car fixtures which are needed immediately and which would be given six months delivery or longer if bought in the open market.

Safety in the Wood Shop

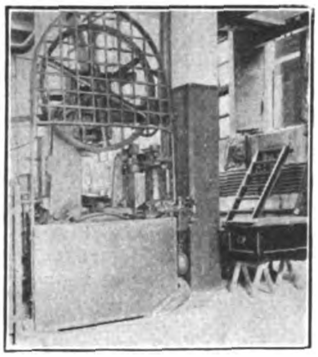
THE ACCOMPANYING group of pictures shows the woodworking mill of the Nashville Railway & Light Company. This shop is particularly interesting for the precautions taken to safeguard employees from accidental contact with moving parts of machines, and to provide for their comfort. The equipment of the shops consists of the following machines: A 16-in. four-side molder, 9-in. four-side molder, blind slat molder, two-drum sander, band re-saw, band saw, plunger mortiser, column mortiser, 24-in. planer, 9-in. surfacer, double head shaper, and crossarm boxer.

Referring to the illustrations, No. 3 is a general view of the woodworking equipment. The band saw shown in No. 1 has the moving wheel well incased with a slat protection made of iron strips, which are riveted together. This gives an open construction, and at the same time fully protects the moving parts. An effective method of mounting guards and gages for a shaper is shown in No. 2. The exhaust piping for removing various cuttings is also to be seen in the background.

A surfacer with safety head and a grated protection that swings around to protect the cutting parts is shown in No. 4. The cutting tool is in a sort of pocket, so as to prevent accidents. The 24-in. planer shown in No. 5 has the belt well shrouded, and the protection of moving parts, together with the piping for cuttings shown in No. 6, which is a molding machine, is particularly interesting. The small pulley shown in the center of this machine has a right and left-hand thread so as to keep the belt from dropping. A crossarm borer is shown in No. 7, with all moving parts protected.

Light Track Construction in Texas*

THE standard type of paved trackwork adopted by the El Paso Electric Railway consists of 90-lb. A.R.A. rail, oak ties, spaced 24 in. on centers, 12 in. of crushed stone or gravel ballast, with a two-course concrete pavement of 7½ in. total thickness. This has proved to be both the best and cheapest construction so far developed in Texas, according to the statement and is original with this company. Full advantage has been taken of the soil and climatic conditions peculiar to this section, in adopting an even lighter standard construction for paved tracks where Birney cars only are used. A.S.C.E. rail of 75-lb. section is laid on 6-in. x 8-in. x 7-ft. ties, with 6 in. of ballast under the ties, and a 6-in. concrete pavement. This has proved entirely satisfactory, both as a track structure and a durable street surface.



Track of this character has been built in 1923 for $7.20 per foot, according to the company, while the 90-lb. construction cost about $9. The latter is stated to be at least $2 per foot cheaper than monolithic concrete with grooved rail and brick or asphalt pavement.

A further development in the track construction has been the use of steel ties laid on ballast, in conjunction with concrete pavement. Track of this type has been built that will undoubtedly compare favorably in ability to stand up under heavy traffic with any other in the country. It is somewhat more costly than wood tie construction, but should be even more durable.

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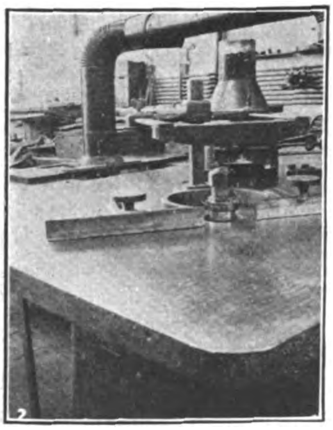
*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association.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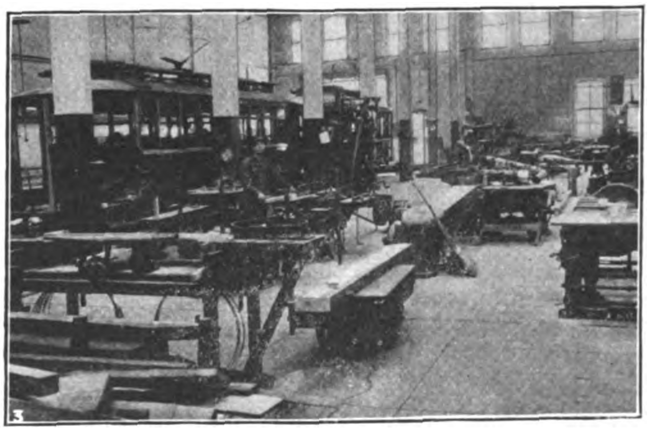
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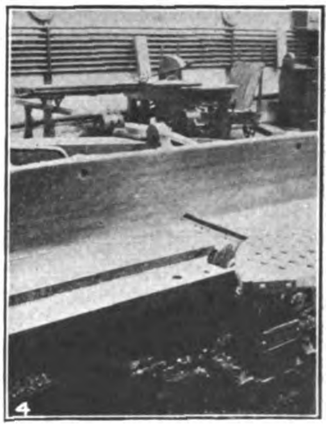
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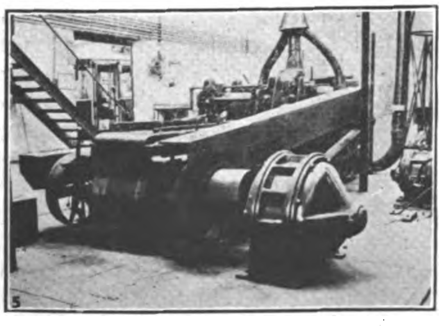
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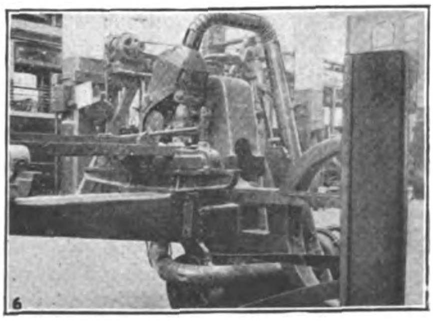
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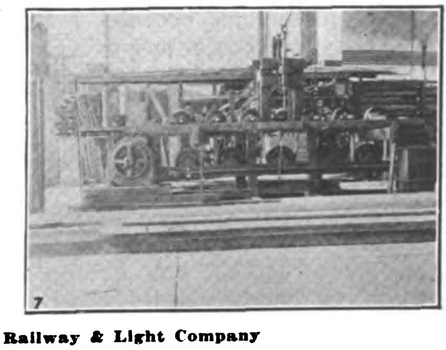
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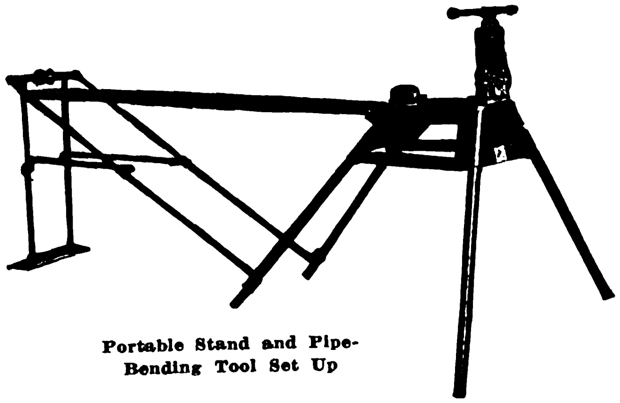
Safety Protection for Woodworking Tools in the Shops of the Nashville Railway & Light Company

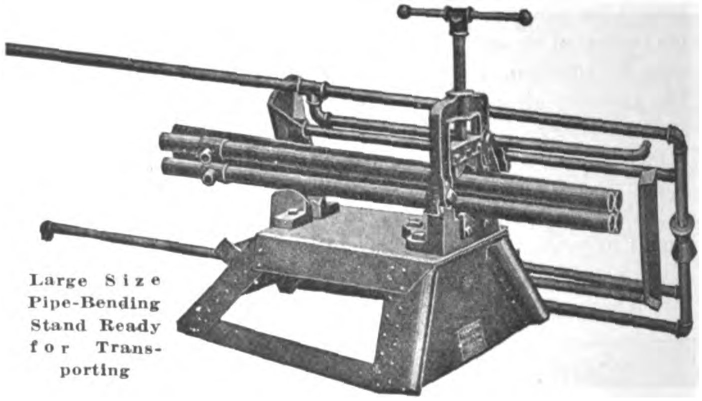
No. 1. Slot work protection made of iron strips for wheel of band saw.
No. 2. Shaper with guards and gages in position.
No. 3. General view of woodworking equipment.
No. 4. Safety head attached to surfacer.
No. 5. Method of shrouding planer belt.
No. 6. Molding machine with moving parts protected.
No. 7. Method of protecting moving parts on a crossarm borer.

New Equipment Available

Portable Vise and Pipe Bending Stand

A PORTABLE vise stand and pipe bender has just been developed by H. P. Martin & Sons, Owensboro, Ky. This stand is made of No. 16 sheet iron riveted and braced at the corners with angle irons, which also serve as pockets for four supporting legs. The legs are made of steel tubing and extend outward sufficiently to brace the stand against upsetting, tilting or skidding. The stand is supplied with either a hinge or chain vise, as desired. The vise is fixed rigidly to the top of the frame at one end in such a position that short nipples can be threaded without injury to the workman's hand. A guide and rest for the pipe while it is being cut or threaded is provided at the end of the frame opposite to that on which the vise is installed. This assists in keeping bends free from kinks and also in locating the bends accurately.


Portable Stand and Pipe-Bending Tool Set Up


Large Size Pipe-Bending Stand Ready for Transporting

The stand can be dismantled by pulling the legs out of their sockets and fastening them in the vise. Convenient handles are provided for carrying. As the sides of the frame are open with a brace across the bottom, the frame provides a convenient rest for pipe tools where oil from the stocks will drain off without running down the handle. The equipment weighs 60 lb. and can be assembled or dismantled in half a minute. It occupies a space of 6 ft. x 8 ft.

The outfits are built in two sizes, one for pipe ranging from ⅛ in. to 2½ in. in diameter and another for heavier pipes up to 4½ in. diameter. The larger size is provided with a roller on the rear support to keep correct alignment and to enable one man to move the full length of pipe forward or backward without unnecessary labor. The weight of the 4½-in. size machine is 172 lb., with a hinge vise and 156 lb. with a chain vise.

Headlight with Special Metal Reflector

A HEADLIGHT with special case and sealed silver-plated reflectors has been developed by the Pyle National Company, Chicago, Ill., for use on electric locomotives or interurban cars. The parabolic reflector is 18 in. x 9 in. and is spun from heavy-gage sheet copper. The inside surface is prepared for the quadruple silver plating by grinding and polishing operations.

The case is of No. 16 gage copper-bearing steel and is protected on the outside by two coats of flexible black baking enamel, and on the inside by the application of an aluminizing preparation. A machine finished, cast aluminum-alloy door frame forms the front of the case and a slot hinged door ring, which is also machine-finished aluminum alloy casting, is sealed against a heavy gasket by the tightening of five wing nuts on hinged bolts. The front glass is made of clear convex heat-resisting glass and is held and sealed against the door-ring gasket by means of bronze fasteners.

Lamp replacements are made by loosening the bronze ring nuts and swinging the door open. This construction makes the fitting of front glasses convenient and avoids the necessity of breaking electrical connections, or disturbing the focal adjustments for renewing lamps. The headlight cases are made in four different styles.

Convenient Size Electric Drill

AN ELECTRIC drill for holes up to ⅜ in. in diameter has just been placed on the market by the Argyle Railway Supply Company, Chicago, Ill. The drill weighs about 5 lb. and is operated by a special Westinghouse motor with a full load speed of 850 r.p.m. The motor can be operated on either direct or alternating current. The handle grip of the drill is kept cool by a ventilation system which brings cool air into the back of the handle. Incoming air is distributed to all parts of the motor.

A special switch for operating the electric drill has been developed by the Cutler-Hammer Manufacturing Company, so that the drill runs only when the operator is actually gripping it. The position and operation of the switch is natural, and can be released readily without shifting the hand. The drill chuck bearings and two armature bearings have bronze bushings and spring oilers which retain a considerable amount of lubricant. The thrust in drilling is taken up on a ball bearing which works between two hardened ground steel surfaces. The gears are packed in grease. The pinion is of steel with helical teeth, cut directly on the armature shaft. The chuck is of the Goodell-Pratt keyless type, requiring no tools for opening or closing. To prevent the armature from turning, when opening or closing the chuck it is only necessary to press the spring stop into the slot in the end of the armature shaft. This locks the shaft and the chuck may then be turned without difficulty.

The News of the Industry

Subway Financing Sought

Detroit Commission Prepared to Present Plans at Special Session of Michigan Legislature

The Detroit Rapid Transit Commission will seek the aid of the state Legislature at a special session to be convened in December, to secure the passage of an amendment to the rapid transit act adopted last spring by the Legislature to pave the way for financing the construction of a system consisting of subways or elevated railways.

The commission's plans for financing rapid transit construction in Detroit are embodied in a tentative amendment drafted by P. J. M. Hally, special counsel for the Rapid Transit Commission. It is pointed out that funds for rapid transit construction could be secured:

1. By levying a special ad valorem tax on the total wealth of the city.
2. By assessing benefits of rapid transit on the local area benefited in such manner and in such proportion of the cost of rapid transit construction as the legislative body of the city may determine.
3. By issuing bonds against the rapid transit property.
4. By combining the foregoing.

It is the desire of the commission to lay the rapid transit plan before the electors at the election next April. If the amended bill is passed by the Legislature it is the intention of the commission to seek its submission to the voters, together with a "definition of a general plan of assessment" at a special election to be called, probably in February. Then the comprehensive plan for rapid transit which is being worked out by the engineers for the commission would be presented to the voters in the spring.

ENGINEER OUTLINES WORK

The work to date as outlined by Major John P. Hollihan, engineer engaged in studies and surveys for the rapid transit system, includes the determination of a satisfactory plan of financing a rapid transit system, without using the faith and credit of the city. In this work it was necessary to go thoroughly into assessed values of property throughout the city; and to estimate the probable increase in values that would accrue to property directly benefited.

The engineers of the commission have conferred with the City Plan Commission on the thoroughfare plan covering the proposed metropolitan area, with a view to enabling the commission to present a final plan for the joint consideration of the department of public works, department of parks and boulevards, the street railway department and the rapid transit commission. These bodies should, in the opinion of Mayor Doremus, determine the thoroughfares required to relieve the present motor vehicle traffic inside the city limits and indicate for the consideration of the adjoining municipalities and counties, the probable future requirements of Detroit as the city expands. The commission is also conferring with the Detroit Bureau of Governmental Research on the proposed metropolitan area. The work of the commission is being carried on with the aid of an appropriation of $70,000 by the City Council.

Municipal Ownership Recommended for Phoenix

A special citizens' committee has recommended to the City Commission of Phoenix, Ariz., that the system of the Phoenix Railway be municipally owned. It is proposed to purchase the system from General M. H. Sherman, Los Angeles, Cal., its owner, in thirty annual payments of $12,000, without interest, the gross sum being about equal to the valuation placed on the railway by the State. If the plan for the purchase is carried out as proposed the road would be leased to the Central Arizona Light & Power Company for operation by it for twenty years. Meanwhile the city would be called upon to spend $400,000 to rehabilitate the system and to provide $190,000 for paving between the tracks. Most of the money so required would be raised by the sale of bonds. It is said that the railway in Phoenix is operated at a loss of about $15,000 annually, due principally to the operation of an interurban line between Phoenix and Glendale district.

The report of the committee grew out of the controversy between the company and the city over franchise matters and the alleged inability of the company to meet the terms with regard to paving included in the original grant to the railway.

One Day Off Compulsory.—One day off in eight without pay except in emergency cases will be mandatory upon employees of the Seattle Municipal Railway beginning Jan. 1, 1924. A resolution to this effect has been unanimously passed by the City Council, but Mayor Brown intimated that he would veto the measure, declaring that it would be impossible for the railway to put the regulation in effect by the date named. The ordinance means the hiring of between seventy and eighty men, and D. W. Henderson, superintendent of railways, states that it will be impossible to train that number in the time given.

Non-Union Pledge Void

Circuit Court Rules Against Law Forbidding Employers to Exact Non-Union Pledges

The California state law forbidding employers to exact pledges from employees not to join labor unions has been held void. Decision to this effect was handed down by the United States Circuit Court of Appeals on Nov. 13 in a case affecting the Pacific Electric Railway. The opinion of the Circuit Court affirms the decision handed down by the United States District Court of Los Angeles, which enjoined labor unions from organizing the non-union men of the Pacific Electric Railway.

The injunction is made permanent. It is directed against the Brotherhood of Railway Trainmen and the Brotherhood of Locomotive Engineers. It said:

> Activities without lawful excuse, engaged in by the unions, were: Unionizing the employees of the railway and the drawing of them into a controversy in which they had no substantial cause for complaint; calling strikes after organizing 1,200 of the 1,500 employees; striking when the country was at war in the face of the Presidential proclamation that there should be no strikes or lockouts during the war, and striking while the complaints of the employees were being submitted by the railway to a represenative of the United States Department of Labor.

The court held these activities interrupted the railway company's business in intrastate and interstate commerce to its irreparable damage.

On Aug. 16, 1919, certain employees of the Pacific Electric Railway elected to strike. It was alleged that the men had been influenced in this decision by certain officials of the Brotherhood of Railway Trainmen and Brotherhood of Locomotive Engineers.

The results of the strike, engaged in by a portion of the company's employees, were reviewed in this paper for Sept. 6, 1919.

In July, 1918, a similar strike was attempted, but this strike, undertaken during the war, was quickly ended by the railway securing in the Federal courts an injunction against certain officials of the trainmen's unions restricting interference between the Pacific Electric Railway and its employees.

Since obtaining this injunction during the first strike in July, 1918, it was possible to obtain an order from the courts in August, 1919, during the second strike making the restraining order effective during the second strike.

In March, 1922, the Pacific Electric Railway sought to have the Federal court make this injunction against strikers permanent. This move was reviewed in the ELECTRIC RAILWAY JOURNAL of March 18, 1922, page 489. Another reference to the matter was published on page 721, Oct. 28, 1922.

More Passengers But Less Revenue with Five-Cent Fare

Definite Conclusions Impossible from Results of First Month's Operation of New Fare System on Public Service Railway—Bus Competition Continues to Be the Crux of the Problem

ALTHOUGH the total number of passengers carried by the Public Service Railway of New Jersey during the month of October, 1923, was approximately 400,000 more than the number carried during October, 1922, the total revenue was smaller and a deficit of $382,753 resulted. Except for a changed rate of fare the operation of the railway was about the same as in the corresponding month of the previous year, with only a nominal increase in the number of car-miles and car-hours.

The compilation of the figures for the first month's operation under the new fare system was made public on Nov. 26. Passenger revenue for October, 1923, was 36.59 cents per car-mile as against 45.24 cents per car-mile a year ago, and $3.43 per car-hour this year as against $4.27 in October, 1922. The total operating revenue was $1,836,185, from which operating expenses of $1,577,748 were deducted, giving an operating ratio of 85.93 per cent instead of 67.68 per cent. The gross income for the month of October, 1923, was $55,737 as against $505,777 in 1922.

FIRST MONTH OF 5-CENT FARE ON PUBLIC SERVICE RAILWAY COMPARED WITH CORRESPONDING MONTH OF PREVIOUS YEAR

	October, 1923	October, 1922
Total operating revenue....	$1,836,185	$2,190,098
Total operating expenses....	1,577,784	1,482,321
Operating ratio, per cent...	85.93	67.68
Gross income............	$55,737	$505,777
Total income deductions..	438,490	446,541
Net income or *deficit*...	*$382,753*	$59,235
Revenue passengers carried	33,508,564	27,187,790
Transfer passengers carried	139,740	6,060,930
Total passengers carried....	33,648,304	33,248,720

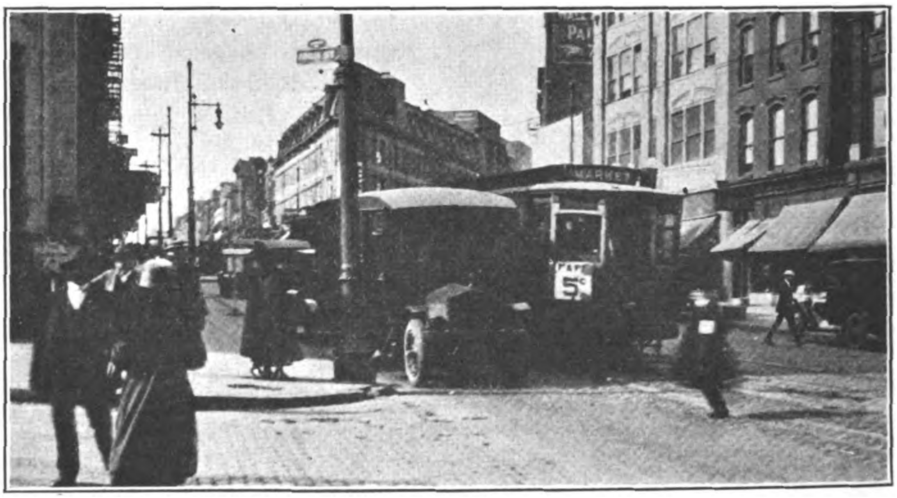
Operating expenses increased greatly due almost entirely to higher wages which were granted the company's employees as a result of the settlement of last summer's strike. The expenses for way and structures were less this year than last; the expenditures for equipment were slightly higher; power expenses were markedly less and other items showed very little change except that for conducting transportation, which was more than $100,000 higher.

NUMBER OF REVENUE FARES INCREASE

The number of revenue fares for the first month of the new system was much greater than in previous months, being 33,508,564 as against 27,187,790 in October, 1922. This large increase, however, is offset by the loss in transfer passengers which decreased from more than 6,000,000 to only about 140,000. Thus, the total number of passengers carried was 33,648,304, a slight increase over the number carried during October a year ago which was 33,248,720.

It is impossible to tell exactly what this means in the way of increased riding because a single individual who rides in two zones and pays two fares is listed as two passengers under the existing system of compiling the figures. While this was true also of the figures for October, 1922, there were then few two-zone riders compared with the number of such riders under the present system.

It would appear that the railway traffic is still suffering somewhat from the effects of the seven-weeks shutdown this summer. At least the bus traffic in some places is heavier than before the strike. In the Newark area, for example, the number of passengers carried by buses in October of this year was 8,066,263 as against 7,062,333 a year ago. An influential factor in the situation has been the exceptionally fine weather which has prevailed all during the summer and fall, and this has undoubtedly had a tendency to favor the bus business.



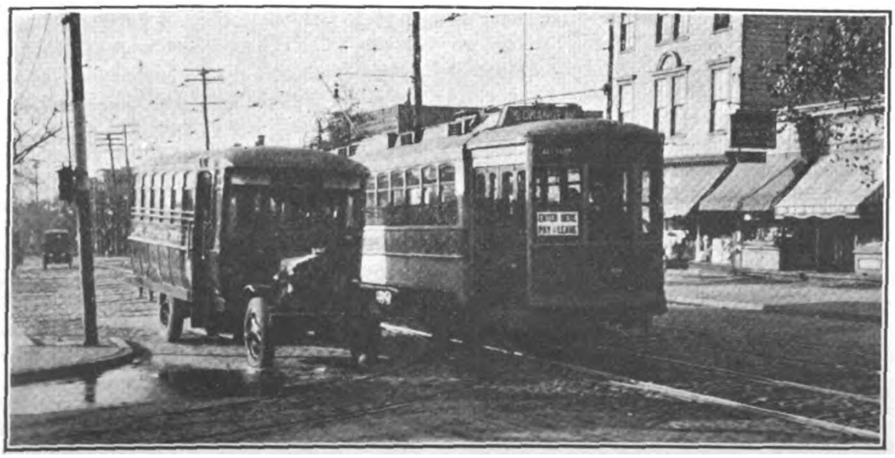
Bus Blocks Entrance to Trolley—A Familiar Scene

Under the circumstances it would be premature to draw any definite conclusions from the figures of the first month's operation. It is said that the railway income is steadily increasing and this tendency may be expected to become more pronounced as winter approaches and bad weather sets in. However, the average fare per revenue passenger has been reduced from 7.83 cents to only 5.31 cents which means that there must be a very large increase in riding before the railway revenue will equal what it used to be under the old fare. This outcome appears to be doubtful as long as the destructive bus competition continues on the same streets with the railway.

CAMDEN BUSES BOUGHT BY RAILWAY

In the Camden district the company has already taken steps to get control of the situation by buying up a large number of buses. With these vehicles in the hands of the railway it is planned to co-ordinate the bus and street car services.

Elsewhere the railway has undertaken plans to reduce the cost of operation. It has been announced that one-man cars will replace the present two-man cars on several lines in Newark and it is expected that the same plan will be tried by the company on other lines.



Bus and Trolley Give Similar Service at Same Time on Same Street

Legislation Needed to Further Electrification in New York

A plan for the solution of the west side traffic problem by the construction of an elevated freight railroad was presented on Nov. 26 by the New York Central Railroad at a joint hearing of the Transit Commission and the Public Service Commission.

The hearing was upon the company's application to the Public Service Commission for an order specifying the method of the electrification of its west side line in conformity with the Kaufmann law, passed by the last Legislature, and an application to the Transit Commission for a change of grade on all streets crossing the west side tracks, under the general law placing one-half of the expense upon the railroad, one-fourth on the state and one-fourth on the city.

The plan presented by the railroad provides for the construction of an elevated railroad most of the way from Spring Street to the Harlem River, eliminating all grade crossings. The total cost is estimated at between $60,000,000 and $70,000,000, which the railroad would pay except the cost of eliminating the grade crossings, estimated at from $15,000,000 to $25,000,000, which would be divided by the company, state and city.

Ira A. Place, vice-president of the New York Central, in charge of its law department, said that while the two questions of elimination of grade crossings and electrification were legally separated, they should be considered together.

George McAneny, chairman of the Transit Commission, expressed belief that legislation would be needed to accomplish any result. Mr. McAneny explained that a law was passed in 1911 permitted the city to reach an agreement with the railroad on a plan and that a law of 1917 permitted the commission to prepare a plan for submission to the railroad with the railroad paying the cost. Mr. McAneny said that, in any event, appeal would have to be made to the Legislature to get an appropriation under the general change of grade law for the relocation of the tracks. An adjournment was taken to Dec. 6.

Pacific Electric Railway Employees to Be Provided with Insurance

Employees of the Pacific Electric Railway, Los Angeles, are to participate in the group insurance plan recently announced by the Southern Pacific Company for all its employees. More than 7,000 employees of the Pacific Electric System will enjoy the benefits by the ruling of the Southern Pacific Company that subsidiary company employees are entitled to the insurance provisions made.

Employees in the service six months receive $250 insurance free of cost.

The plan becomes effective when 75 per cent of eligible employees of the company subscribes for the insurance, but not before Jan. 1, 1924.

The policy taken out by the Southern Pacific Company is estimated to exceed $100,000,000. The insurance plan affects 90,000 employees of the Southern Pacific interests. The policy is to be written by the Metropolitan Insurance Company.

Target of Opinions in Massachusetts—One-Man Cars

The one-man car is still being assailed in Massachusetts. William Walsh of the Massachusetts branch of the American Federation of Labor and a former business agent of the Boston Street Carmen's union has asserted that he has asked for and received promise of support of the Boston Central Labor Union in the initiative and referendum movement to eliminate the one-man cars in the State. Petitions asking for the initiative and referendum are being circulated. An attack on the one-man car is planned in Boston where a group of men headed by an attorney has announced intention to petition the Legislature to prohibit the use of the one-man cars. The Attorney General has approved the form of the petition, which provides that if the proposed law is defeated by the Legislature it shall go to the people for referendum vote.

Chairman Jackson of the Boston Elevated Railway trustees has notified Mayor Curley of that city that one-man cars have come to stay. They are used only on routes, Mr. Jackson said, where cars run by two men would be unprofitable. The one-man controversy in Massachusetts has been referred to previously in the ELECTRIC RAILWAY JOURNAL.

Arbitration Next Step in Springfield

Arbitration will be necessary before the new contract between the employees of the Worcester Consolidated Street Railway, the Springfield Street Railway and the officials of the trolley lines are drawn. The present contract expires Dec. 31. In accordance with the terms of the present contract the employees and employers have exchanged proposals for the new contract, but both sides have made demands which have put them far from agreement. Bentley W. Warren, Boston, representing the company, and James H. Vahey, representing the men, have had several conferences since the union committee and trolley officials met in an effort to reach some basis that would permit resumption of negotiations for an agreement, but without making progress. In the arbitration proceedings Mr. Warren will be the companies' representative and Mr. Vahey will act for the carmen. They will select the third man.

The major demands of the trolley men are for an eight-hour day, an increase in the maximum pay for uniformed men from 58 cents to 80 cents an hour and for operators of one-man cars an increase from 66 to 95 cents an hour with a 30 per cent increase for all miscellaneous employees.

The company has proposed maintaining the present schedule of wages if certain bonuses are eliminated, but suggests that if the bonuses are retained the pay of uniformed men should be reduced 5 cents an hour. President Clark V. Wood has also told the men that the increase they ask with the eight-hour day would add $750,000 to the annual payroll and that the company cannot do this on the present revenue with a 10-cent fare, and could not do it with an increased fare because the decrease in riding would keep the income down.

Peter Witt for Municipal Ownership.—Councilman-elect Peter Witt, former street railway commissioner at Cleveland, urges that the city take over the property of the Cleveland Railway at its estimated value of $35,000,000. Mr. Witt says it can be done "without costing the taxpayers a penny." As he sees it the money now paid by car riders in the shape of taxes totals $1,378,933 a year and is constantly increasing. Mr. Witt says the money thus saved, which now goes to Washington, Columbus and townships in the county outside of the city, will more than pay for the present outstanding obligations of the Cleveland Railway in less than twenty-five years.

Must Remove Snow.—The Boston & Worcester, Milford & Uxbridge and Springfield Street Railways will be obliged to remove all snow piled by their plows onto walks previously cleared by householders, according to a recent decision of the Massachusetts Department of Public Utilities. They must also remove snow which the plows throw in the highways cleared by the various towns and cities of Massachusetts through which they operate lines.

Pay Increases for More Detroit Men.—The October payroll of the Department of Street Railways at Detroit was increased approximately $10,000 due to advances in pay granted by the Street Railway Commission to employees of the system other than platform men.

Houston Company States Its Case.—"That Houston May Fulfill Her Destiny" is the title of an instructive pamphlet issued for the patrons of the Houston Electric Company. The company, in publishing the pamphlet, states that it wants its patrons to know what it is doing and has done during the past three years to furnish transportation in its city. It gives, in detail, the various construction and improvement undertakings and the money that was involved in each improvement. But the company urges upon people the need for greater improvement as the expansion is pressing down heavily on them; that millions of dollars more will be necessary during the next few years, and asks for the support and confidence of the people to insure the success of the transportation system.

Financial and Corporate

Committee Reports at Montreal

Favorable Findings Presented by Shareholders Who Inquired Into Affairs of Holding Company

The committee that was appointed by shareholders of the Montreal Tramways & Power Company, Montreal, Que., to look into the affairs of that corporation has made a report. The *Canadian Financial Post* says that the report is on the whole favorable to the present directors and management, but that there may be a renewal of the fight for control that was waged during the summer.

DATA FURNISHED STOCKHOLDERS

The report provides shareholders with data concerning the profits and losses of the company since formation eleven years ago. This is the first time shareholders had any information concerning the company's operations between 1912 and 1920.

The committee's statement indicates that the total income for the years from 1912 to 1922 was $5,978,062, and the total expenditures during the period were $7,752,699. This made a deficit of $1,774,636 for the company as of the period ended Nov. 30, 1922.

The company had losses in six years and profits in five of the eleven years under review and the record for each year was as follows:

Year	Income	Expenditure
1912	$282,500	$690,184
1913	503,047	457,913
1914	513,544	442.953
1915	543,082	846,046
1916	558,669	493.762
1917	560,898	863,190
1918	475,471	534,360
1919	463,760	1,409,514
1920	814,224	719.513
1921	587,054	717,724
1922	675,811	577,536

This succession of losses is blamed upon the fact that it was a very serious task to finance the company owing to opposition encountered at the start, and later to conditions created by the war. This was responsible for high cost of short date financing and high premiums on United States funds. Under more favorable conditions, says the report, this expense would have been curtailed, and sources of revenue increased considerably by a fuller development of the assets of the company.

OPTION AGREEMENT TO BE EXERCISED

The report also deals with the point that has been criticized by shareholders, namely, the transfer of 59,500 common shares of the Canadian Light & Power Company to the Montreal Public Service Corporation. These shares were handed over as collateral, when Montreal Public Service made a bond issue of $2,550,000 in 1919. There was an agreement to be made that Tramways & Power Company was to have the right to repurchase these securities together with $1,700,000 of Canadian Light & Power Company 5 per cent bonds, due 1949, for the sum of $2,050,000. The committee was informed by officers of the company that the transaction was treated as a temporary sale to meet the suggestions of the solicitors, but the intent between the parties was that the securities were pledged with right of redemption. The report recommends that the agreement of option be executed without further delay.

The Montreal Tramways & Power Company owns a majority of the ordinary stock of the Montreal Tramway and the stock of the Canadian Light & Power Company.

Order Entered to Dismantle Famous Colorado Line

The famous Colorado Springs & Cripple Creek District Railway, once referred to by Theodore Roosevelt as offering "the one-day trip that bankrupts the English language," has finally been declared dead *de jure*, it having died *de facto* a considerable time ago.

In May, 1919, the United States District Court appointed a receiver for the property on application of trustees for the bondholders. In May, 1920, the same court authorized the receiver to discontinue operation of the line except as to a small portion thereof. The Public Utilities Commission of Colorado thereupon filed petition for modification or vacating of the last mentioned order contending that since the property was located wholly within the State of Colorado the question of its operation or discontinuance was with the state commission. In October, 1922, the receiver sold the property at foreclosure and the purchaser proceeded to begin to dismantle and junk the line. Interested citizens petitioned the state commission to take jurisdiction on its own motion and protect their rights.

After a hearing the commission ruled that a foreclosure sale transferred property subject to all duties and responsibilities under which the original owner held the property; that the purchaser at foreclosure was without right to abandon public service except by permission of the lawful authority having fully jurisdiction thereof.

At the close of the hearing an agreement entered into by all parties sanctioned an order to permit the dismantling except as to certain portions, which order was entered.

The road consisted of 75 miles of track.

$8,100,000 Value Fixed at Norfolk

Sum Decided Upon by State Commission $2,000,000 Less Than Company's Claim

The valuation of the Norfolk railway properties of the Virginia Railway & Power Company was fixed on Nov. 24 by the State Corporation Commission as $8,100,000. This is less by more than $2,000,000 than the sum claimed by the company and more by about the same amount than the valuation asserted by the city of Norfolk. The company's 7-cent fare, granted some time ago by the commission, will be continued in force, for the commission has pointed out that even at the valuation claimed by the city, the earnings of the company at 7 cents are not more than 4 per cent on the valuation.

The company claimed a valuation of $10,639,084 and the city contended for $6,152,532.

The commission states in its decision that in the five months from June until October during which the 7-cent fare, with four tokens for a quarter, was existent, the company's net earnings applicable to return after payment of taxes, depreciation and renewal reserve, were $181,070, as compared with $165,660 for the corresponding period of last year. The commission gives it as its opinion that the 7-cent fare should stand.

Major Alexander Forward, commissioner in charge of transportation problems, rendered the opinion.

The commission decided to include in the company's valuation the summer resort owned by it at Norfolk and rented for a sum which is less than enough to pay the carrying charges. The decision holds that if it were not for the summer resort there would be insufficient permanent travel from the limited number of residents on the Ocean View line to warrant its continuance, but that the city undoubtedly would not want the line discontinued and that in view of these considerations the property should be allowed as a part of the valuation.

From the company's valuation the commission has deducted $1,091,000 for accrued depreciation. The claim of the city on account of this item was $1,960,735. Minor deductions were made for other items.

Receiver Appointed for Washington-Virginia Line

On petition of five Philadelphia trust companies acting in behalf of bondholders, the Washington-Virginia Railway was declared insolvent by the Circuit Court of Fairfax County, Va., on Nov. 23. At the request of the petitioners, Arthur L. Reynolds, manager of the company, was appointed receiver. The company operates several interurban lines between Washington and near-by points in Virginia, among them the line to Mount Vernon. Insolvency was admitted by the company in its answer to the petition. An intervening petition, filed by Mattie M. Newcomer, a stockholder, was rejected by Judge Samuel G. Brent.

New Plan Submitted for Service Between Kewanee and Galva

Kewanee, Ill., has not given up its effort to get back its city line and the interurban line from Kewanee to Galva. Despite the fact that the first plan to sell $100,000 in stock to refinance the Galesburg & Kewanee Electric Railway failed, merchants, manufacturers and city officials have devised another plan, the adoption of which will make possible the resumption of service at an early date.

Opinion is unanimous that the loss of the lines would be a severe handicap to the community. At an enthusiastic meeting of the business interests B. F. Parker, vice-president of the Kewanee Boiler Company, and general chairman of the Pittsburgh-plus commission, presented a plan which was adopted.

This plan included an offering to the public of a $75,000 issue, secured by first mortgage on all the property of the company including the $60,000 in new equipment; $45,000 of capital stock unsecured; provision for the sale of certain pieces of real estate owned by the company and some of the old equipment such as cars to the amount of about $20,000. This would leave a total of $12,000, according to the arrangements, necessary to refinance the proposition, including the purchase of new cars and other equipment. The original figure estimated as necessary to cover everything was $140,000. The new figure, $120,000, would be covered by the bond issue of $75,000 and the stock issue of $45,000. The new arrangement also calls for the selling of a block of tickets, good within a year, to the largest possible number. It is said that many persons who could not take a $50 bond might be willing to expend $15 or $25 for tickets. This would bring money in for immediate use and would help the company in many ways. The difficulties in Kewanee have been referred to previously in these pages.

Minority Report by Pittsburgh Receiver

Charles A. Fagan, one of the receivers of the Pittsburgh Railways, acting independently of his colleagues, W. D. George and S. L. Tone, has filed an exception to the plans for the reorganization of the company to follow the lifting of the receivership. In a petition filed by his attorneys in the United States Court Mr. Fagan declares that the company is still "manifestly insolvent."

In his attitude on this matter Mr. Fagan takes direct issue with former Judge Henry G. Wasson, who as special master, delegated by the court to take testimony and advise it as to whether the reorganization was possible, recommended the reorganization.

Mr. Fagan says that he disagrees with the master's conclusions in view of the present insolvency of the company, the absence of any offer to cure the insolvency, the failure to provide for the refunding or extension of bonded indebtedness now in default, and the failure to adduce sufficient evidence to prove that the corporation can operate at a profit and make ends meet in the next several years.

According to Mr. Fagan the general tenor of the master's report is to the effect that if the receivership should be terminated at the present time there would be ample cash and other assets on hand to meet all the current obligations as they mature and leave a substantial amount for working capital. In Mr. Fagan's opinion this is a conclusion unwarranted by the evidence.

Further Progress Reported in Kansas City Reorganization

The committee representing the bondholders of the Kansas City Railways reached a new agreement on Nov. 24 with the lawyers who represent the holders of personal injury judgments by which these claimants will receive 50 cents on a dollar in cash and the remainder of their claims in first mortgage bonds of the new company to be organized after the receivership has been lifted. The total of the outstanding accident claims is more than $2,000,000.

To protect the worth of the bonds which the judgment holders will receive it has been agreed that the total initial bond issue against the reorganized property shall not exceed $20,000,000. Provision is also made to reimburse the bondholders' protective committee for $500,000 advanced to pay state taxes prior to the receivership.

The agreement stipulates that the parties shall collaborate to obtain an equitable adjustment of all the matters involved in the reorganization.

Judge Stone of the Federal court expressed himself as pleased at the progress made and said that on the determination of the priority of claims against the railways will depend the progress of negotiations for the reorganization of the property. The hearing set for Nov. 26 was postponed until Dec. 27. If further progress toward arranging the reorganization is reported on Dec. 27 Judge Stone said that he will continue the hearing until Jan. 7.

An order issued by the court to pay a group of claims against the old receivership was rescinded by Judge Stone, pending publication of a notice to claimants.

Should a foreclosure be necessary the bonds would be issued by the reorganized company, but if the present company were to continue, then the old bonds must be retired and new ones issued by it.

Holders of the second mortgage bonds and the notes are so widely scattered with respect to their residence that fully a month will be required to consult all creditors. If these holds can be induced to accept the plan as now proposed, then a hearing on the priority of claims will be avoided.

Receivership of Brooklyn Line Expected to Be Lifted Soon

The Brooklyn, Queens County & Suburban Railroad, Brooklyn, N. Y., is expected soon to emerge from the hands of the receiver as the result of an agreement reached between the Brooklyn City Railroad and the reorganization committee of the Brooklyn-Manhattan Transit Corporation.

Until the present, the Brooklyn, Queens County & Suburban Company has not been considered in the reorganization plan of the Brooklyn-Manhattan on account of the claims against this road by the Brooklyn City Railroad. At the time of the major reorganization it was impossible to make an adjustment with the Brooklyn City Railroad so that the Queens County line remained in the hands of the receiver. Lindley M. Garrison was appointed July 14, 1919.

The plan for the reorganization of the property does not contemplate any foreclosure sale.

The agreement that has just been reached between the Brooklyn City Railroad and the Brooklyn-Manhattan Transit Corporation has to do only with the bonds of the Queens County & Suburban Company. It does not apply in any way to the construction suit involving $10,000,000 between the two railway companies, which is still pending.

The Brooklyn, Queens County & Suburban Railroad has 64 miles of track. Its assets according to the 1922 report were $14,094,904.

McKinley-Studebaker Group Buys Into Kansas City Light

The Illinois Power & Light Corporation, which was formed a few months ago to consolidate the McKinley and Studebaker public utility properties, has acquired through purchase J. Ogden Armour's interest in the Kansas City Power Securities Company. E. H. Rollins & Sons, bankers, Chicago and New York, acted for the purchaser. The exact number of shares transferred has not been made public, but it can be stated that the transaction involves approximately 33 per cent of the Kansas City Power Securities Company's outstanding capitalization, which consists of 40,000 shares of common stock and 40,000 shares of preferred stock.

The Kansas City Power Securities Company, in which Mr. Armour was the most important individual stockholder, is a holding company owning the entire capital stock of the Kansas City Power & Light Company, which in turn has numerous subsidiaries. This transaction does not involve Mr. Armour's holdings in the Kansas City Railways. Since the reorganization of the utilities in Kansas City in 1916 the Kansas City Power Securities Company has had no control over the Kansas City Railways.

The purchase of the stock by the Illinois Power & Light Corporation has been approved by the Illinois Commerce Commission.

Auction Sales in New York

At the auction rooms of A. H. Muller & Sons there were sold on Nov. 28 the following securities:

4,201 shares Interborough Consolidated Corporation, preferred, $100 lot.

3,322 shares Interborough Consolidated Corporation, common, $160 lot.

100 shares of Interborough Consolidated Corporation, common, $2 lot.

200 shares Interborough Consolidated Corporation, preferred, $14 lot.

$6,250 Central New York Southern Railroad Corporation deposit receipt under subscription agreement, dated Oct. 2, 1913, $100 lot.

Net Income Shows Increase.—For the four months ended Oct. 31, 1923, the passenger revenue of the Brooklyn City Railroad, Brooklyn, N. Y., was $3,907,962, against $3,897,784 for the same four months a year ago. The net corporate income increased from $615,248 for the four months ended Oct. 31, 1922, to $644,544 for the same four months of the current year.

Valuations Fixed in Michigan.—The Michigan Public Utilities Commission has fixed the following valuations based on reproduction costs, less depreciation, on Michigan electric lines: Michigan Railroad, $9,418,140; Michigan United Railways, $10,139,542; Grand Rapids, Holland & Chicago, $2,462,396; Grand Rapids, Grand Haven & Muskegon, $2,562,489; Southern Michigan Railway, $1,618,645; Benton Harbor-St. Joe Railway & Light, $2,140,613. The total valuation aggregates $28,341,326.

"Be a Partner."—The Wisconsin Public Service Corporation has recently issued a handsomely colored booklet of fifteen pages entitled "Be a Partner." The booklet was issued in order that the widespread movement among public utility companies to provide home investors with sound investments and to perpetuate co-operative relations of the company with its customers and employees may gain greater headway.

Additional Bonds Sold.—The National City Company recently sold at 92¾ and interest an additional block of $380,000 general mortgage and refunding mortgage gold bonds of the Northern Ohio Traction & Light Company, Akron, Ohio. The bonds are known as series A, 6 per cent. They are dated March 1, 1922, and are due March 1, 1947.

Issue Covers Completed Improvements.—The $107,000 issue of bonds by the Fort Smith Light & Traction Company, Fort Smith, Ark., authorized by the State Commission, is not intended for new improvements to the system, but for work already completed. This issue was referred to in the Nov. 24 issue of the ELECTRIC RAILWAY JOURNAL.

Gold Notes Offered.—A syndicate is offering at 98½ and interest to yield more than 6.70 per cent $10,000,000 of convertible 6½ per cent gold notes of the Northern States Power Company, Fargo, N. D. The notes are dated Nov. 1, 1923, and are due Nov. 1, 1933. The proceeds from the sale of these notes will be used to redeem the entire issue of the company's ten-year notes due April 1, 1926, now outstanding in the amount of $7,805,000 and to reimburse the company in part for expenditures heretofore incurred for additions extensions and betterments to the properties of the system.

Dividends Resumed on Common Stock.—The Duluth-Superior Traction Company, Duluth, Minn., has resumed dividends on its common stock by the declaration of a quarterly dividend of $1 a share. This dividend and the regular quarterly dividend of $1 a share on the preferred stock are payable on Jan. 2 to stock of record of Dec. 15. The company paid the last quarterly dividend of $1 a share on Oct. 1, 1918, on the common stock. The gross revenues of the Duluth-Superior Traction Company for the nine months ended Sept. 30, 1923, amounted to $1,413,990 against $1,314,036. The net income after the consideration of fixed charges and taxes was $75,496 for the nine months of this year, against $52,963 for the nine months' period ended Sept. 30, 1922.

Booklet Describes Property.—The Byllesby Engineering & Management Corporation has prepared a twenty-page booklet entitled "Back of the Investment," illustrating the properties comprising the Northern States Power System, Minneapolis, Minn. Photographic views made from an airplane of the system is an added feature included in the booklet.

Figures Show Tax Distribution.—According to figures presented to the National Tax Association recently by John E. Walker, former tax adviser to the United States Treasury Department, more than 8 per cent of the total tax burden of the country in 1921 was collected from three agencies of transportation, the motor car, steam railroad and electric railways.

Surplus Falls Off.—The gross earnings of the Lake Shore Electric Railway, Cleveland, Ohio, from Jan. 1, 1923, to Sept. 31 were $2,084,953, against $1,866,401 for the same period a year ago. The surplus shows a falling off from $158,894 for the period from Jan. 1 to Sept. 31, 1922, to $138,807 for the same months of the current year.

Net Receipts.—$3,855.—The municipally owned Norton, Taunton & Attleboro Street Railway, Norton, Mass., shows for the nine months ending Sept. 30 gross earnings of $57,241 and operating expenses for the same period of $53,385, leaving net receipts of $3,855. Four $1,000 notes due the municipalities from the railway have been paid in this period, together with the interest accrued.

Additional Refunding Bonds Offered.—Tucker Anthony & Company, New York, N. Y., is heading a syndicate which is offering for subscription at 99½ and interest, to yield more than 6½ per cent, an additional issue of $1,039,500 of first mortgage and refunding lien sinking fund 6½ per cent gold bonds, Series A, of the Consolidated Power & Light Company, Huntington, W. Va. The bonds are dated March 1, 1923, and are due on March 1, 1943. The company owns and operates the entire electric power and light and electric railway business in Huntington, W. Va., Roanoke and Lynchburg, Va., and surrounding communities, as well as the gas business in Lynchburg, Va. The system also does the entire electric light and power and electric railway business in Ironton, Ohio, Ashland and Catlettsburg, Ky., and the intermediate territory.

Bonds Offered.—Halsey, Stuart & Co., New York, N. Y., are offering $1,500,000 of first lien and refunding convertible 6 per cent bonds, series A, of the Monongahela-West Penn Public Service Company. The bonds are offered at $96.25 and accrued interest to yield about 7 per cent.

Atlanta Lines Report Increase.—Cars of the Georgia Railway & Power Company, Atlanta, carried 228,110 more passengers during October, 1923, than during October, 1922. The increase in revenue amounted to $14,502. The total number of passengers transported in October this year was 6,724,071, with gross revenue of $456,744. Substantial increases have been shown nearly every month this year over the corresponding month of last year.

Assessments Completed.—A total valuation of $104,410,000, on which a tax of $2,171,140 will be paid, has been placed on the properties of the Wisconsin light, heat, power and electric railway companies by the Wisconsin Tax Commission, which has just completed its report. The assessment on the Milwaukee Electric Railway & Light Company is based on a value of $59,000,000.

Partial Abandonment Approved.—The Public Service Commission has approved a declaration of abandonment by the Southern New York Power & Railway Corporation of that part of its electric railway system in Oneonta, starting in Main Street and running through Broad to the east end, and from Chestnut and Main Streets east in Main Street and Broadway to Market Street. There was no opposition to the proposed abandonment.

Improvement in Net Earnings.—The gross earnings of the East Penn Electric Company for the year ended Aug. 31, 1923, were $2,798,350, against $2,262,135 for the same period a year ago. The net earnings were $1,006,129 and for the year ended August a year ago were $859,737.

Net Income Increases.—The gross earnings of the Twin City Rapid Transit Company, Minneapolis, Minn., were $10,210,795 for the nine months ended Sept. 30, 1923, against $10,251,795 for the same period a year ago. The net income after the consideration of fixed charges, etc., amounted to $1,151,755 against $1,044,509 for the nine months ended Sept. 30, 1922.

Traffic and Transportation

Ten-Cent Fare Asked in Kingston

The Kingston Consolidated Railroad, Kingston, N. Y., has applied to the Public Service Commission for permission to charge a 10-cent cash fare in Kingston with a ticket fare of 8 cents. The present fare rate is 7 cents.

The railroad operated on a 5-cent fare until April 15, 1919, when a 6-cent fare was authorized. The company later sought to abandon certain parts of its lines in Kingston, but this step was put off and an agreement reached whereby a 7-cent fare was placed in operation on Dec. 23, 1920.

The company in its petition to the Public Service Commission states that in 1921 certain economies were put into effect which produced a saving over 1920 of $10,000. Since 1921 these savings have gradually diminished because of wage increases and other expenses, so that by 1924 the savings will be wiped out entirely.

The revenues received from its railroad at the present passenger rate are gradually diminishing, accounted for by the increased use of automobile and bus operations and other causes, so much so that the return upon the capital invested is not sufficient and will not allow the petitioner to add to and improve its railroad property or to keep pace with the growth and development necessary and meet the requirements of the territory served.

The company in a supporting petition shows that for the first nine months of 1923 its total revenue from street railroad transportation was $169,213. The total operating expenses were $129,026 and its taxes $11,367.

Fare Increase Sought by Texas Electric

The Texas Electric Railway, which owns and operates the lines in Sherman and Denison, Tex., has asked authority of the City Commissions in both cities to increase fares on the grounds that the present fares cannot permit the company to operate at a profit. Authority is sought to increase fares from 5 cents to 7 cents for regular cash fares and to sell four tickets for 25 cents, or a fare of 6¼ cents where tickets are purchased. The fare for children and students in schools would be 3½ cents. Jack Beall, president of the Texas Electric Railway, and James P. Griffin, vice-president and general passenger agent, both of Dallas, visited the two cities and placed the matter before the City Commissions.

Messrs. Beall and Griffin told the City Commissions that the gradual increase in the number and use of automobiles had brought about a gradual reduction in passenger revenues of the companies operating in Texas, and that the situation had reached a point where relief must be given if the traction companies are to maintain the high standard they have maintained in the past.

Applications for similar increases are pending in Waco and Corsicana.

Action Taken Against Jitneys

All jitneys are off Federal Street in Youngstown as a result of the Council's latest anti-jitney ordinance. The ordinance moving the jitneys west of the postoffice also was put into effect. The west-bound jitneys that formerly parked in West Federal Street now are stationed in Chestnut Street. City Solicitor Leighninger, at the order of the Council, is now drawing up an ordinance to be presented shortly that will prohibit the jitneys from entering the congested district.

Prior to this order the jitney controversy in Youngstown had been renewed when Safety Director Hamilton ordered the police to enforce sections of the jitney ordinance restricting the discharging of passengers in downtown streets. As a result J. H. Hogan, representing South Side jitney men, countered with a demand that the city cease discrimination in traffic enforcement, pointing out to Hamilton that the Pennsylvania-Ohio buses were violating traffic laws in parking in East Boardman Street. The jitney ordinance passed by the City Council on Oct. 8 provided among other restrictions that jitneys entering or leaving the city by Market Street should load and unload on Front Street between Market and Phelps. Mr. Hamilton said that he had ordered the police to enforce every traffic ordinance to the limit and that if the Pennsylvania-Ohio buses were still violating the law the drivers of them would be treated the same as others.

Six-Cent Fare in Cleveland

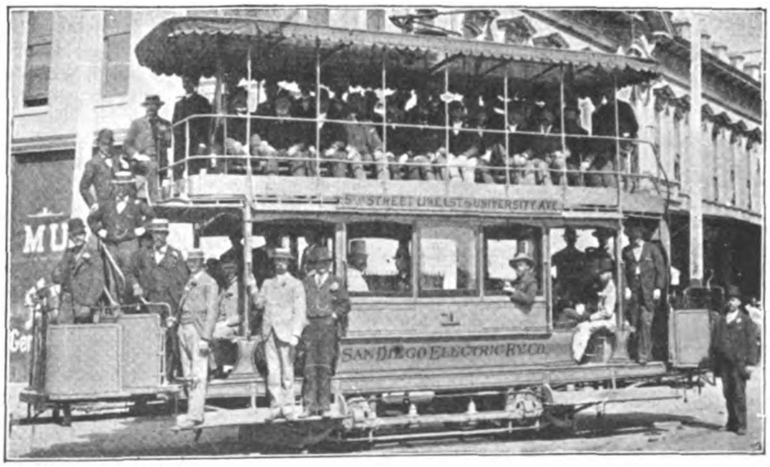
Car riders of the Cleveland Railway on Dec. 1 started to pay a 6-cent fare with a penny charge for transfer. Nine tickets were sold for 50 cents. This is the second street car fare raise in Cleveland within two months. The last raise went into effect on Sept. 1, when the sale of eleven tickets for 50 cents was discontinued.

The increased rate of fare is due to the fact that the company's interest fund now shows a deficit of $83,801.54. Originally placed at $500,000, the company's franchise provides that the fare goes up when this fund drops below $300,000 and the fare goes down when the fund goes above $700,000. The 6-cent fare is the highest permitted by the franchise.

The increased rate of fare is due to the big deficits that were accumulated during the period when Clevelanders were riding for a nickel, officials of the Cleveland Railway say.

Fare Increase Denied.—The Oklahoma Corporation Commission has denied the application of the Tulsa Street Railway to increase its fare from 7 cents to 8 cents. The Tulsa property has been struggling against jitney operation for several years and in order to meet this competition extended its service some months ago by putting on buses to be operated in connection with the city lines. In its application the company says that the operation of these buses contributed to a heavy loss sustained during the past year. The commission held that losses due to operation of motor buses in connection with a city street railway system would not be considered in determining the proper railway fare.

Will Seek Fare Adjustment.—University of Washington students, represented by a committee appointed by President Sam Mullins of the Associated Students, will appear before the City Council of Seattle shortly to ask for a 2½-cent carfare, with transfer privilege, the same as is accorded to high school students. The matter has already been taken up privately with several members of the City Council.


5TH STREET LINE 1ST & UNIVERSITY AVE
SAN DIEGO ELECTRIC RY. CO.
MU

Reproduced in San Diego Electric Railway "Pass One" to Show the Contrast with Commodious Equipment of Present Day

Abide by Ordinance.—Jitney operators of Shreveport, La., at first threatened to cease operating altogether as a result of a regulatory ordinance passed by the city. The ordinance requires the jitneys to operate continuously from 7 a.m. to 7 p.m. along certain specified routes and on a regular schedule. There are probably fifty jitneys operating in Shreveport and they haul an average of 5,000 passengers daily. After stopping their cars for a short time, the operators resumed service and are obeying the ordinance.

Bus Plan Approved.—The City Council of Toledo has approved the Community Traction Company's plan for motor bus operation. The ordinance which was recently sanctioned provides for the purchase of two modern buses on the Oak Street extension to replace the two machines now being operated in conjunction with the traction system, but on a rental basis. Another bus is being rented and operated on South Erie Street, and this, it is expected, will be replaced by a company-owned motor bus. Arrangements include financing by an addition to the preferred stock.

Accommodates School Children.—Unusual service is being given by the recently started Melrose addition feeder bus line of the Springfield Railway, Springfield, Ohio, in that the bus is diverted twice each day from its regular route in order to carry school children directly to and from the Highland School, about a mile distant. The plan was adopted after being suggested to residents by P. E. O'Brien, general manager of the railway. Twenty-six children are carried daily in the bus at a round trip fare of 3 cents each.

Opera Service on North Shore Line.—With the opening of the opera season recently by the Chicago Civic Opera Association, the Chicago, North Shore & Milwaukee Railroad started a special train service to accommodate opera patrons living in the near North Shore towns. This special train service consists of a dining car and coach. It leaves Great Lakes at 6:32 p.m. and arrives at Congress and Wabash, at the door of the Auditorium, Chicago, at 7:50 p.m. The "Civic Opera Special," as it is called, makes express stops in the intervening towns between Great Lakes, 34 miles north of Chicago, and Chicago.

Better Transportation This Winter.—H. G. Tulley, president of the International Railway, Buffalo, in referring to the new snow equipment for the coming winter said that in the winter of 1922-23 the cars were operated by new men who, while trained operators, were unfamiliar with the severe weather encountered in that part of the country. The organization was now a year old and, benefiting by the experience of last season, was expected to provide better winter transportation this year. It was pointed out by President Tulley that most of the cold weather delays are caused by stalled automobiles, trucks and other vehicles blocking the tracks, often interfering so greatly with the operation of plows and sweepers, as to permit the storm to gain headway and become unmanageable. City co-operation in keeping the tracks free from obstruction, and in strictly enforcing traffic regulations, would do much, Mr. Tulley said, to insure regularity of service and elimination of delays.

Safety Meetings Held.—The Los Angeles Railway has started a series of safety meetings in which officials of the company meet trainmen at the five carhouse divisions. One general topic is discussed at each division in five consecutive weeks. Attendance is voluntary on the part of trainmen, but attendance records are kept and are of use in selecting trainmen for the special Christmas bonus under the merit and bonus system of the company. In the first series of meetings C. M. McRoberts, general claim agent, and John C. Collins, supervisor of safety, have paved the way for future safety meetings by arousing the interest of trainmen in the cause.

Large Sum for Transporting Mail.—During the last fiscal year $604,915 was expended by the Post Office Department for the transportation of mail by electric railways. At the close of the fiscal year authorizations were in effect over 8,521 miles of electric railway. This included service on 317 routes. During the full twelve months 10,883,970 unit miles were traveled. The average cost per mile was 5.24. Compared with the previous fiscal year, the decrease in the number of routes was eleven. The length of routes increased 162 miles. The decrease in the annual travel was 48,799 unit miles. The increase in the expenditure was $12,142, and the increase in cost per unit mile traveled was 0.14 cents.

Working for More Pass Riders.—Sales of weekly passes by the Tacoma Railway & Power Company, Tacoma, Wash., for the week beginning Nov. 12, totaled 12,550, a new high record since the pass system was adopted in July, 1922. A recent innovation in its campaign to make the pass more popular was made by the company with appointment of C. J. Quill to the position of transportation salesman. He has been working among operators of the cars, and the system has already shown results. C. V. Allen, advertising manager, states that unless the pass sales can be brought up to 15,000 weekly the company will have to sell the passes for more than $1 each. The company has for its objective the 15,000 mark. At the present number, the passes are not paying, although 43 per cent more passengers are being carried than before the pass was adopted.

Complaint Sustained.—On the complaint of George Bullock, receiver of the Buffalo & Lake Erie Traction Company, the Public Service Commission has ordered R. H. Henneous to desist from operating a motor vehicle freight line between Erie and North East, Pa., until he receives a certificate of approval.

Legal Notes

ILLINOIS—*Policy of Public Utilities Act Stated.*

The policy of the Public Utilities Act is not to promote competition between common carriers as a means of providing service to the public, but that through regulation of an established carrier occupying a given field, and protecting it from competition, it may be able to serve the public more efficiently and at a more reasonable rate than would be the case if other competing lines were authorized to serve the public in the same territory. To warrant the Commerce Commission in granting a bus company authority to operate its lines and to serve the same public already served by an existing street railway system it must appear that the railway was not rendering adequate and convenient service, and that the operation of the bus lines would eliminate such inadequacy and inconvenience, the convenience and necessity of the public being a primary consideration. The fact that a bus company is limited to a 5-cent fare, and the street railway company serving the same district is charging a larger fare, does not of itself warrant an order by the Commerce Commission allowing the bus company to operate in such district; nor is the convenience or inconvenience of even a considerable number of individuals the test for an order of convenience and necessity. [West Suburban Transp. Co. vs. Chicago & W. T. Ry. Co., 140 Northeast Rep., 56.]

FEDERAL COURTS—*Eviction of Colored Interstate Passenger Justified Only By Proof of Existence of Reasonable Segregation Regulation.*

To justify the eviction of a colored interstate passenger for his refusal to occupy a seat in that part of an interurban electric car set apart for colored passengers, it is incumbent on the carrier to show that it had in force a regulation requiring the segregation on its trains of white and colored passengers and that such regulation was reasonable. Oral instructions by a carrier to its conductors to segregate interstate passengers by races is not a valid regulation binding on the passengers, since knowledge of such regulation should be brought home to the passenger at least constructively before he enters the car. [Washington, B. & A. Electric R. Co. vs. Waller, 289 Federal Rep., 598.]

NEW YORK—*Duties and Rights During a Strike Defined.*

An attempt of city officials to prevent a street railway company from taking out of its barns or operating any of its street cars during a strike of its employees, on the ground that it is to preserve law and order, will be enjoined. It is the duty of the police and department of public safety to preserve order and protect the property of citizens, individual and corporate, and it is their duty to protect a street railway company in running its cars during a strike of its employees. The right of any man to work, if he wants to, is as inalienable a right as the right of another to quit work, and no person has a right to prevent another from working when he wants to. [Schenectady Ry. Co. vs. Whitmayer, Mayor, et al., 199 New York Suppl., 827.]

FEDERAL COURTS: *Rights of Lessor, Lessee and Creditor.*

Where a receiver for a lessee defaults in rental under the lease, further operation of the railway property by the receiver is considered to be with the acquiescence of the lessor, and is for its account and at its risk. The relations between the two will not be affected by the fact that the officers are the same or the same person is the receiver, and a street railway company, which furnished power, maintenance and repairs to the lessee of another system, necessary to keep it in operation, has an equitable lien on the earnings of such system until it is paid, and a receiver for the lessee is justified in paying from earnings bills for power, etc., furnished prior to the receivership. While a materials creditor furnishing supplies necessary to the operation of the railway has an equitable lien therefore, on the current earnings, the receiver is obliged to pay for the same only to the extent of his ability. [Westinghouse E. & M. Co. vs. Brooklyn Rapid Transit Co., et al., 291 Federal Rep., 836.]

MICHIGAN—*Duty of Motorman to Slow Down When Signaled.*

Where a truck became stalled on the crossing of an interurban line at night and an attempt was made to stop an approaching interurban car by waving a lantern, because a curve hid a view of the obstruction from the motorman, it was his duty to slow down sufficiently that he could stop if exigencies required, though the light was white, and such as was sometimes used by intending passengers in attempting to stop the car at a place where it did not stop. Hence evidence of motorman's failure to slow down was a question for the jury as to negligence. [Vernick vs. Detroit, M. & T. S. L. Ry., 194 Northwest. Rep., 992.]

FEDERAL COURTS—*Proceeds of Tax Refund Not a Trust Under an Adjustment mortgage.*

Where a street railway company had issued adjustment mortgage bonds entitled to receive stipulated interest payments only from the net income of the company, with express provision it should be non-cumulative, a refund to the receiver of the company of excess taxes collected during three previous years, in none of which the full amount of interest on the bonds had been paid, was not a trust fund in the hands of the receiver for payment of additional interest for those years. [American Brake Shoe & Foundry Co. vs. New York Rys. Co., et al., 291 Federal Rep. 112.]

Personal Items

M. R. Boylan Acting General Manager

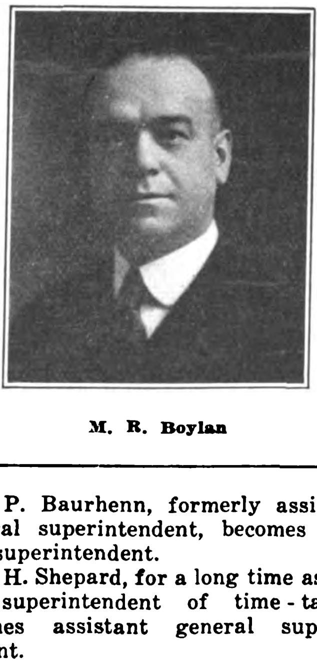
Public Service Railway Announces Changes in Personnel Affecting Department Heads

A number of changes have been announced in the personnel of the Public Service Railway, Newark, N. J., effective on Dec. 1. They follow:

M. R. Boylan, who has been general auditor, becomes acting general manager during the absence of R. E. Danforth, who starts Dec. 1 on a vacation of four months.

A. T. Warner, traffic engineer, becomes assistant to the acting general manager.

P. W. Pierson, executive assistant, becomes assistant to the acting general manager.



M. R. Boylan

L. P. Baurhenn, formerly assistant general superintendent, becomes general superintendent.

W. H. Shepard, for a long time assistant superintendent of time-tables, becomes assistant general superintendent.

Newton W. Bolen, general superintendent, becomes special representative of the company in Hudson County.

H. C. Donecker, assistant general manager, becomes assistant to Vice-President Edmund W. Wakelee.

Mr. Boylan is a native of New Jersey. His service with the Public Service Railway and its subsidiaries dates back to 1892. That is a long while. Matt Boylan just before that had qualified at school as a stenographer and secretary and it was in these capacities that he served in the office of C. B. Thurston, president of the Jersey City & Bergen Railroad, then a horse car line. During the next few years the Jersey City system was electrified and Mr. Boylan went from his clerical position through the transportation department, the shops and the power generating stations.

All this sounds natural enough in the line of progress, but not everybody grows, not everybody progresses. The advance of years has ripened his judgment and steeled his determination. Matt Boylan can decide things for himself. And having decided them he can see them through.

But to get back to Mr. Boylan's career with the railway. Things had been happening outside of the company while he was learning and earning, and the upshot of them was that the Jersey City & Bergen Railroad was absorbed by the Consolidated Traction Company and the latter leased to the North Jersey Street Railway. Some there are who would have seen their chances fade with a change of this kind, but to Mr. Boylan it meant greater opportunity with a greater corporation. It meant, too, that he had found himself. He had tried nearly all branches of railway work, and had come to the conclusion that his natural forte was figures. So in 1899 he became voucher clerk in the auditors office. After serving successively as bookkeeper, chief clerk and assistant auditor, he was in 1904 made general auditor of the Public Service Railway, which had acquired the North Jersey Street Railway the previous year. In 1910 he was elected first vice-president of the American Electric Railway Accountants' Association and in 1912 was made secretary-treasurer of the association. In 1916 he become president of the Accountants, serving through 1919.

Mr. Boylan's accession to the managerial staff is a natural one. He knows the company, he knows the men in the service, he knows the public with which the company deals, he is popular personally all over the territory served by the company, his training in accounting has taught him care and he will bring to the problems now before the railway a new and detached point of view.

Mr. Baurhenn, who becomes general superintendent, was formerly assistant general superintendent. Before that he was superintendent of the Bergen division. He joined the Public Service Railway when the company took over the New Jersey & Hudson River Railway & Ferry Company from Ford, Bacon & Davis.

The other men included in the changes have all been connected with the company for considerable periods. Mr. Bolen's term of service dates back to 1903. Before that he had been a division superintendent with the Brooklyn Rapid Transit Company. Mr. Donecker went to the Public Service Railway in 1913 from the post of secretary of the American Electric Railway Association. He has been engaged in street railway work since 1890, both in the operating and manufacturing ends.

Mr. Gaboury Appointed to Safety League

Arthur Gaboury, formerly superintendent of the Montreal Tramways, has been appointed general manager and secretary of the Province of Quebec Safety League. The appointment was announced following the meeting of the executive committee of that organization, held recently under the chairmanship of Zephirin Hebert, president. In appointing him, Mr. Hebert said that Mr. Gaboury had had considerable experience in connection with the safety movement in Montreal and that he considered Mr. Gaboury's selection a very fortunate one.

Mr. Gaboury has been identified with the Montreal Street Railway since 1894, and has been a prominent figure in the railway field ever since. Early in the current year he resigned as superintendent to become vice-president and managing director of the American Druggists Syndicate, Ltd., of Canada. Besides his railway affiliations Mr. Gaboury has given his services for the advancement of French activities, which in 1918 received public recognition from the French government in the form of a title of Officer of the Academy.

Bert C. Wood, for the past five years chief claim agent of the Youngstown Municipal Railway, has recently been appointed general claim agent of the Pennsylvania-Ohio Electric Company and the Youngstown Municipal Railway, Youngstown, Ohio. Mr. Wood has been connected with the above companies for the past fifteen years and previous to that time with the Youngstown Sheet & Tube Company.

F. A. Clark is back again as superintendent of power of the City Light & Traction Company, Sedalia, Mo. As was announced recently in the ELECTRIC RAILWAY JOURNAL he was transferred to Washington, Pa., to become a member of the organization which is constructing the new gas plant there. He chose, however, to return to Sedalia.

Matthew C. Carswell, with a record of almost fifty years service, recently resigned from the Interborough Rapid Transit Company, New York, N. Y. He held the position of master carpenter. Since he joined the elevated railway system on June 1, 1878, up to September of this year he served under four general managers, four chief engineers, two engineers maintenance of way and three master carpenters. In 1882 he became foreman carpenter, assistant master carpenter in 1904 and master carpenter in 1908. At a dinner in his honor on the evening of Oct. 17 Mr. Carswell was presented with a traveling bag which it was said "was too small to hold even a part of the affection and esteem his associates had for him."

W. F. Graves Leaves Montreal

He Was Chief Engineer of the Montreal Tramways for More than Nine Years

Willard F. Graves, whose resignation after nine years service as chief engineer of the Montreal Tramways was previously noted in the ELECTRIC RAILWAY JOURNAL, began his electric railway career as assistant engineer of construction on the South Side Elevated Railway in Chicago, now a part of the Chicago Elevated Railways System. With that company he had charge of the very extensive reconstruction work involved in building a third or express track from Twelfth Street to Forty-third Street, which included grade, line and station, revision of the old structure, as well as the new track. During the progress of this work the very heavy regular train service was handled by means of temporary tracks and structures.

W. F. Graves

After that work had been finished Mr. Graves was engaged as superintendent of track, in the reconstruction and maintenance of the tracks of the Chicago City Railway under the 1907 ordinances. During the three years of rehabilitation, as specified in the ordinances, practically the entire track system of 300 miles was rebuilt. This work necessitated at times the employment and organization of between 3,000 and 4,000 men.

From this position he was appointed chief engineer of the Montreal Tramways and engaged in the extensive reconstruction of this property, involving the addition and extension of power houses, substations, tracks, etc., including an extensive system of underground high tension conduits.

While acting as chief engineer of the Montreal property Mr. Graves was engaged to make a track valuation of the Detroit United Railway, and subsequently of the Halifax Tramways & Power Company, Halifax, N. S., and the Quebec Railway, Light, Heat & Power Company, Quebec.

He has been interested for many years in the activities of the American Electric Railway Engineering Association, as a member of the committee on way matters, acting as its chairman during the years 1921-1922 and 1922-1923, and representing the association on several sectional committees of the American Engineering Standards Committee. He is an associate member of the American Society of Civil Engineers, member of the American Railway Engineering Association, Engineering Institute of Canada and the executive committee of the committee on welded rail joints.

Hector Poli has been appointed master carpenter of the elevated lines of the Interborough Rapid Transit Company, New York, N. Y. In this capacity he succeeds Matthew C. Carswell, who resigned recently with a record of approximately fifty years. Mr. Poli entered the employ of the company in 1910 and was promoted to shop foreman in 1913. In 1922 he was made general foreman and became master carpenter on Oct. 1, 1923. In thirteen years he has risen from carpenter to master carpenter.

Obituary

Richard Hapgood

Richard Hapgood, one of the oldest street railway men in the United States in point of service, died recently at his home in Belmont, Mass. He retired in September, 1912, as roadmaster of the Boston Elevated Railway after sixty-four years service. He went to work in 1858 as stableman for the old Union Railway, the original horse car line between Cambridge and Boston. By 1872 he had risen to the position of superintendent of the road, which he held until 1855, when he resigned. A short time later Mr. Hapgood became roadmaster for the Consolidated Street Railway in Boston and later superintendent of the South Boston Railroad. When the latter merged with the West End Street Railway, he remained as superintendent of the South Boston division and was later made superintendent of the Cambridge division. In 1892 Mr. Hapgood became roadmaster of the West End Street Railway and remained in that position when the road was merged with the Boston Elevated Railway.

Henry Pearson, vice-president of the Wason Manufacturing Company, car builders, of Springfield, Mass., died suddenly of heart disease in the car shops Nov. 27 at the age of seventy-one years. Mr. Pearson went to the Wason Manufacturing Company from the Harris-Corliss Engine Works in Providence, R. I., in 1881 to take charge of the machine department. He rose to vice-president and general manager and then to president, holding that office four years, up to 1910, when the plant was taken over by the J. G. Brill Company.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

November Good Month in Copper Market

The copper market came to life during November and more of the metal was sold than for many months. Supplies were adequate to meet the demand, however, though at gradually advancing prices, about 13½ cents being asked at the end of the buying movement. Since then a recession has taken place, and at the end of the month the metal was obtainable at about 13 cents per lb. With the large production now being made in the United States, South America and Africa there seems to be little likelihood of any marked advance in prices, European financial conditions not being such that that continent can buy the copper in the large quantities that it might absorb. On the other hand, prices are now so low that many companies are doing little better than breaking even, so any further important decline may hardly be expected.

Look to the League for Business Hints

Edwin S. Webster, of Stone & Webster, who has just returned from a visit to the League of Nations headquarters, says that he was very much impressed by the amount of information possessed by the league regarding conditions in every country in the world. If one were going into business in any out-of-the-way country he would recommend getting in touch with the league to find out what that body had in the way of information.

Mr. Webster said that one could get accurate information which never before had been made available on almost any country on earth. This is probably a phase of the League of Nations on which many business men generally have not heretofore been well informed.

Winnipeg Property Protects Road at Crossings

The Winnipeg Electric Railway, Winnipeg, Man., has placed orders with the Union Switch & Signal Company for the necessary materials to protect its road against steam trains at four crossings: Notre Dame Avenue, where two of the crossings are involved, one where the Canadian Pacific crosses and the other where both the Midland and Canadian Pacific cross; Academy Road, where two crossings are protected, one crossed by the Midland and Canadian Pacific Railway, and the other by the Canadian National Railway. Light signals, with automatic control, are employed for this protection in all cases except on the Canadian Pacific Railway at Notre Dame Avenue, where automatics are now in service and style "S" semaphore signals will be used. The field installation will be made by the company's regular forces.

Bituminous Coal Production Increases

The output of bituminous coal in October totaled 49,171,000 tons, as compared with 46,175,000 in September and 45,173,000 for October, 1922. The production of anthracite aggregated 8,724,000 tons, as against 2,917,000 in September and 8,578,000 in October a year ago.

General Electric Buys New Property

The General Electric Company has purchased at Los Angeles, Cal., 5 acres of property on which is now located a two-story reinforced concrete building. This will immediately be modified and converted into a fully equipped service shop in which all kinds of electrical apparatus will be rebuilt and repaired. Later a large warehouse will be built on the property and eventually there will probably be a factory.

Japanese Interests and Westinghouse Combine

An arrangement has been made between the Westinghouse Electric International Company and Japanese electrical interests. The new company is known as the Mitsubishi Denki Kabushiki Kaisha, or, in English, the Mitsubishi Electric Manufacturing Company. It is thought that the capitalization will be 15,000,000 yen, or $7,500,000, although definite word on this point has not yet been received.

As a result of progress during recent years Japanese electrical development, including railroad electrification, the utilization of water power, the installation of large steam generating plants and the formation of superpower systems, compares favorably today with that in the United States.

As a consequence of this rapid development, electrical apparatus has become one of Japan's largest imports, and since Japan's principal exports, silk, copper and objects of art, can hardly be expanded by a corresponding degree, it was thought that there was some danger of a continuing unfavorable balance of trade. Hence it seemed wise to certain Japanese interests to stimulate the manufacture of electrical machinery and supplies in Japan.

In pursuance of this policy, the Mitsubishi interests, which are engaged in banking, shipbuilding and steel making, approached the Westinghouse company with a proposal for a co-operative agreement whereby the company was to supply technical skill and experience to a Japanese manufacturing company.

ELECTRIC RAILWAY MATERIAL PRICES—NOV. 27, 1923

Metals—New York

Copper, electrolytic, cents per lb.	13.05
Lead, cents per lb.	6.90
Nickel, cents per lb.	29.50
Zinc, cents per lb.	6.75
Tin, Straits, cents per lb.	46.75
Aluminum, 98 to 99 per cent, cents per lb.	25.50
Babbitt metal, warehouse, cents per lb.:	
Fair grade	52.00
Commercial	25.00

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads	$4.65
Somerset mine run, Boston	2.375
Pittsburgh mine run, Pittsburgh	2.00
Franklin, Ill., screenings, Chicago	1.45
Central, Ill., screenings, Chicago	1.05
Kansas screenings, Kansas City	2.00

Track Materials—Pittsburgh

Standard Bessemer steel rails, gross ton	$43.00
Standard open hearth rails, gross ton	43.00
Railroad spikes, drive, Pittsburgh base, cents per lb.	3.15
Tie plates (flat type), cents per lb.	2.575
Angle bars, cents per lb.	2.75
Rail bolts and nuts, Pittsburgh base, cents, lb.	4.125
Steel bars, cents per lb.	2.40
Ties, white oak, Chicago, 6 in.x8 in.x8½ ft.	$1.30

Hardware—Pittsburgh

Wire nails, base per keg	3.00
Sheet iron (28 gage), cents per lb.	3.75
Sheet iron, galvanized (28 gage), cents per lb.	4.85
Galvanized barbed wire, cents per lb.	3.80
Galvanized wire, ordinary, cents per lb.	3.35

Waste—New York

Waste, wool, cents per lb.	15–18
Waste, cotton (100 lb. bale), cents per lb.:	
White	13–15.50
Colored	10-15

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), per gal.	$0.93
White lead (100 lb. keg), cents per lb.	11.375
Turpentine (bbl. lots), per gal.	$0.93
Car window glass, (single strength), first three brackets, A quality, discount*	84.0%
Car window glass, (single strength), first three brackets, B quality, discount*	86.0%
Car window glass, (double strength) all sizes, A quality, discount*	85.0%
Putty, 100 lb. tins, cents per lb.	4–6

*These prices are f.o.b. works, boxing charges extra.

Wire—New York

Copper wire base, cents per lb.	15.75
Rubber-covered wire, No. 14, per 1,000 ft.	$6.50
Weatherproof wire base, cents per lb.	16.50

Paving Materials

Paving stone, granite, 4x8x4, f.o.b.	
Chicago, dressed, per sq.yd.	$3.60
Common, per sq.yd.	3.20
Wood block paving 3½, 16 treatment, N. Y., per sq.yd.	2.79
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots	54.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd.	1.75
Cement, Chicago consumers' net prices, without bags	2.20
Gravel, ¾-in., cu.yd., f. o. b. N. Y.	1.75
Sand, cu.yd., N. Y.	1.25

Old Metals—New York and Chicago

Heavy copper, cents per lb.	10.75
Light copper, cents per lb.	9.25
Heavy brass, cents per lb.	6.00
Zinc, old scrap, cents per lb.	4.125
Yellow brass, cents per lb. (heavy)	5.75
Lead, cents per lb (heavy)	6.00
Steel car axles, Chicago, net ton	$16.75
Old car wheels, Chicago, gross ton	18.75
Rails (short), Chicago, gross ton	19.75
Rails, (relaying), Chicago, gross ton	33.50
Machine turnings, Chicago, net ton	6.25

Rolling Stock

Michigan United Railways, Jackson, Mich., has sent out inquiries for bids on the construction of six new parlor chair cars which are to be arranged as complete units equipped with baggage and smoking compartments.

Birmingham Railway, Light & Power Company, Birmingham, Ala., has recently purchased four Reo buses to be delivered late in December. They will operate in sections formerly served by the jitneys.

Department of Street Railways, Detroit, recently placed an order for 100 cars. The original order for fifty Peter Witt type cars from the McGuire-Cummings Company was referred to in the ELECTRIC RAILWAY JOURNAL, issue of Nov. 17. This order was later increased to 100 cars and fifty were to be built by the Osgood-Bradley Car Company. This explains the status of the car situation in Detroit which was mentioned in the Nov. 17 and Nov. 24 issues of the paper. The train of three cars which is being built by the Cincinnati Car Company will be delivered about Jan. 1, 1924. This train may be operated by one motorman and three conductors or may be operated by one motorman and one conductor. The one conductor will stand in the middle car, which will be used as an entrance car, and the two end cars will be used as exit cars, there being a passageway between the cars.

Track and Line

Charleston Consolidated Railway Gas & Electric Company, Charleston, S. C., is replacing the double track on King Street with a single-line track.

Grand River Valley Railway, Grand Junction, Col., will build a 3½-mile beet spur into the irrigated country north and west of Fruita, its present terminus. Ultimately the spur will be extended to approximately 12 miles.

Duluth Street Railway is planning to complete the extension to Kenwood next year. This line will be built to St. Marie Street some time next spring. General Manager Warren said that active work would be started as soon as the weather would permit.

United Traction Company, Albany, N. Y., will consider with city officials the proposition of improving Western Avenue from Manning Boulevard west to the Albany city line. It is planned to have the United Traction Company's track on the south side of Western Avenue west of the Manning Boulevard, removed to the center 33-ft. strip of the thoroughfare. The city will then improve the south side of the avenue, lay a new concrete pavement to correspond with the one on the north side and build new sidewalks. It is believed that the United Traction Company will deed to the city the land which is now unused and which constitutes the middle 33 feet of the avenue. If this happens the city will pay all, or a part of the cost of relaying the track.

Springfield, Mass.—The joint committee of Springfield and West Springfield, Mass., on a new bridge across the Connecticut River to replace the bridge burned last September has agreed upon plans for an open-deck steel bridge to cost $873,000, the structure to be 1,135 ft. long and 70 ft. wide, with 54-ft. roadway and 8-ft. sidewalk on each side. Estimates call for $56,000 for electric railway tracks, including metal to carry the wheel base, of which sum $25,000 is to be assessed on the Springfield Street Railway, this expenditure being in addition to the $873,000. A verbal agreement has been made between the street railway company and the city, by which the company would pay the city an annual rental estimated to amount to $1,500 yearly, payments being computed on the same basis as in the case of the Hampden County Memorial Bridge.

Mississippi Valley Electric Company, Iowa City, Iowa, is adding a short stretch of additional track to the Dodge Street line. The work will cost approximately $3,500.

Cincinnati, Ohio.—Extension of Cincinnati's rapid transit loop 4 miles was decided on at a recent meeting of the Board of Rapid Transit Commissioners, when a resolution was adopted to appropriate the property lying between Mitchell and Section Avenues, Norwood. Under the revised plans, the loop will terminate in Oakley, instead of in Avondale. The extension will follow the bed of the old canal and then proceed to Oakley by way of St. Bernard, Carthage and Norwood. Most of the work will be open construction, Frank Raschig, rapid transit engineer, announced, except where the route of the subway intersects railroads or streets. No additional bond issue is necessary for this phase of the work. The commission definitely stated that the money on hand would enable it to construct the subway as far as Oakley.

Power Houses, Shops and Buildings

Jamestown, N. Y.—Owing to the fact that cars of the Jamestown Street Railway, Chautauqua Traction Company and the Jamestown, Westfield & Northwestern Railway are now running entirely on Niagara power the old power house at Jamestown having been dismantled. The equipment to be sold includes nine boilers, four turbines, pumps, condensers, switchboards and other auxiliary machinery.

United Railways, St. Louis has recently added a new bay to the car-building department of the general shops. The addition is constructed along the most modern lines, having steel framing and brick walls, and is made fireproof by the installation of the best fire doors. The new bay has a capacity for holding twenty-four cars while under construction. Situated between the car-building shop and the truck and blacksmith shops is the transfer table. This device is operated when transferring cars from department to department while they are in various stages of construction.

Puget Sound Power & Light Company, Seattle, Wash., announces that tentative plans are under way for a terminal at the corner of Elk and Magnolia Streets in Bellingham to cost $200,000. The terminal is to serve the company's traction trains and stage lines terminating in Bellingham. The proposed structure will be three stories high, with full basement, 150x125 ft.

Trade Notes

The Texas Company, New York, N. Y., producers of Texaco Petroleum Products, has just renewed a contract for the supply of lubricants to the Boston Elevated Railway, Boston. This is the third consecutive year that the Texas Company has obtained this business, one of the largest electric railway lubrication contracts of the country.

Conveyors Corporation of America, Chicago, announces that Jay C. Lathrop, its Cincinnati district representative, has removed his office to 503 Neave Building, Cincinnati.

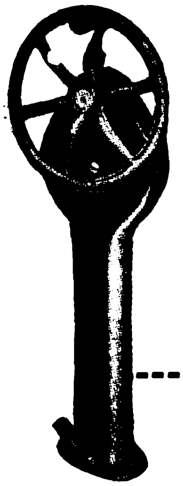
General Electric Company, Schenectady, N. Y., has appointed L. R. Brown manager of the transformer division of the new central station department. He was one of the company's first transformer specialists and has a wide personal acquaintance in the central station industry. In connection with the reorganization following this and other changes in the central station department, G. G. Jeter, H. F. McRell and Clinton Jones are to be sales managers in this division. Mr. Jeter will have charge of transformer accessories, advertising and publicity; Mr. Jones will have supervision of power transformers, and Mr. McRell, distribution transformers.

New Advertising Literature

The Johns-Pratt Company, Hartford, Conn., has issued the second edition booklet of the Noark universal service switches.

International Western Electric Company, New York, N. Y., has issued the latest edition of "Electrical Communication." It is a 150-page booklet containing such articles as Telephone Transmission Over Long Distances, Recent Developments in Telephone Equipment for Train Dispatching Circuit, Telephone Traffic Control for Tramways and other instructive reviews.

MacGovern & Company, Inc., New York, N. Y., has issued a twenty-four-page booklet dated November, 1923, and entitled "Power Machinery—Electrical, Hydraulic, Steam, Gas."



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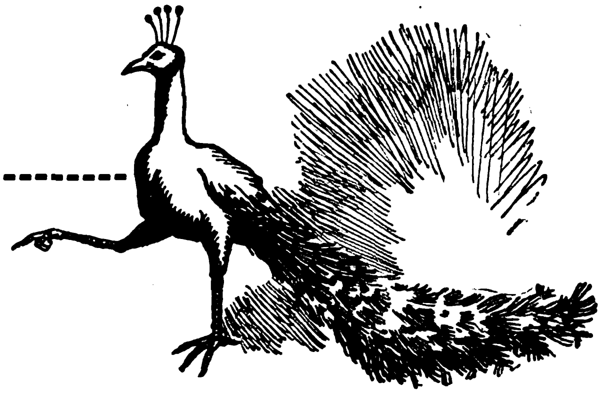
meet all the requirements for safety

Fifty pounds on the 20-in. hand-wheel—an average man's force—will produce a braking power of 1333 lbs. through the 12:52 gear ratio. That's the strong pull.

When it comes to the *long* pull, the Peacock Staffless is without an equal. No matter what condition of brake rigging exists, any length of brake-chain can be handled by this equipment. Even up to 12 feet if necessary.

Will your hand brakes do this? Or will they jam after taking a few turns on the brake drum. Peacock Staffless Brakes wind chain *over* the drum, and drop it in the capacious housing below.

With a braking power three times that of the ordinary equipment, and almost unlimited chain-winding capacity, Peacock Staffless Brakes are a guarantee of safety when emergency stops are necessary.



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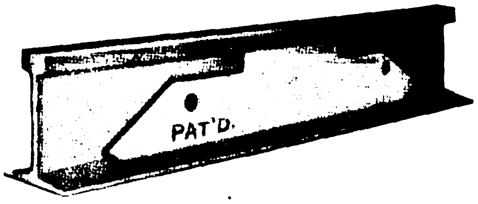

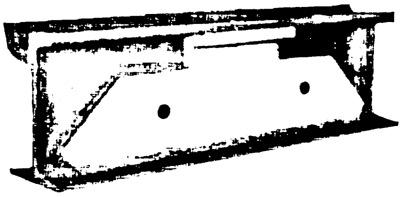

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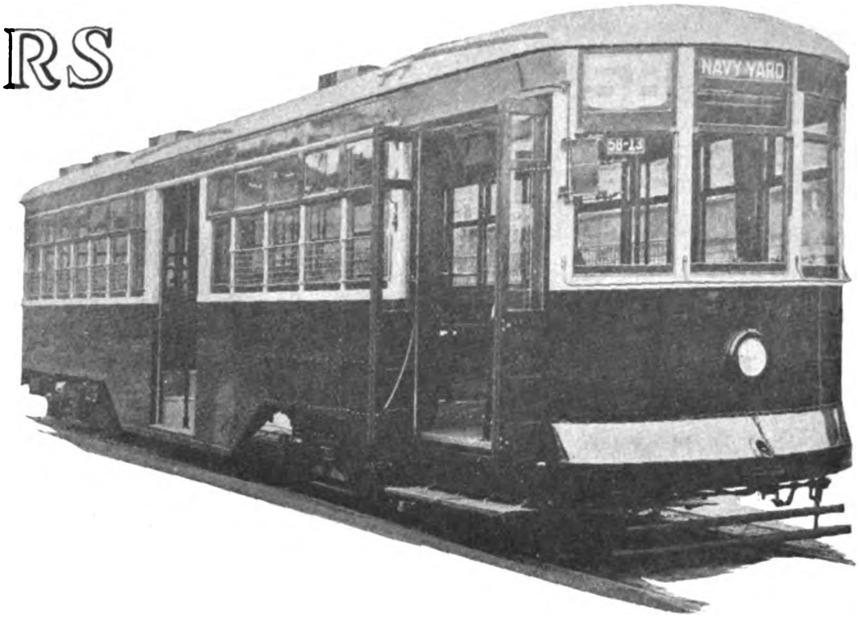

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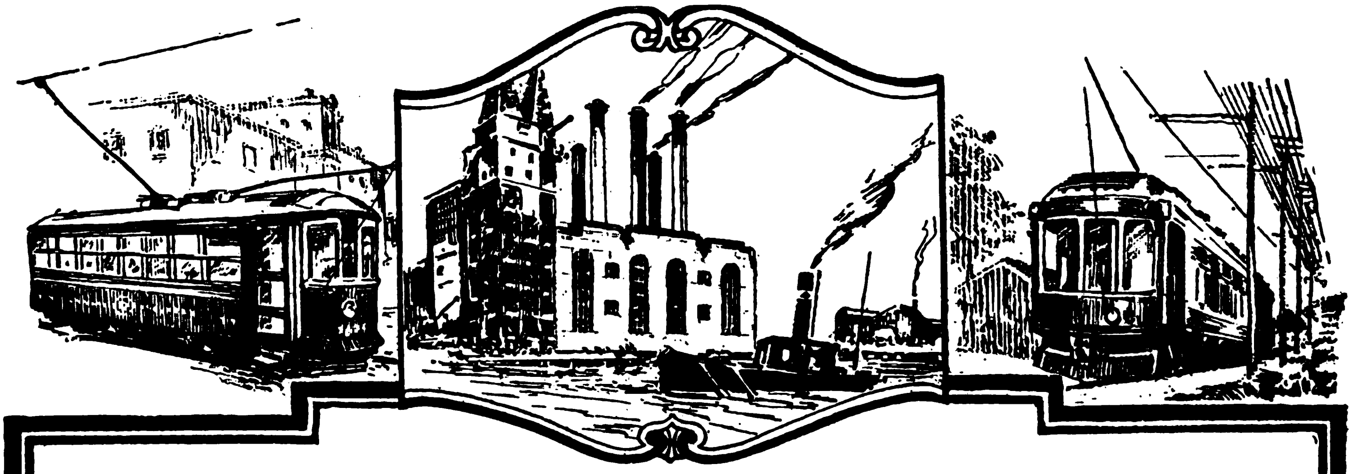

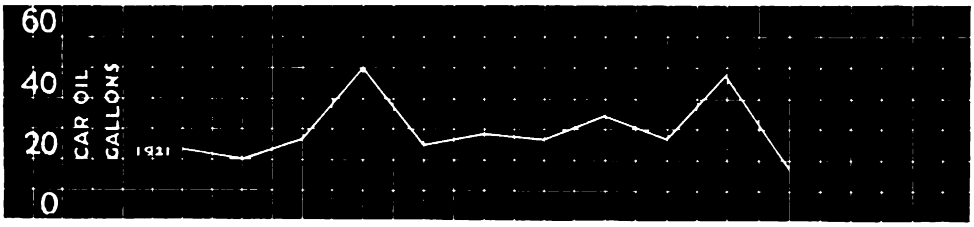

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Our service engineers will be glad to discuss your axle equipment without obligation to you.

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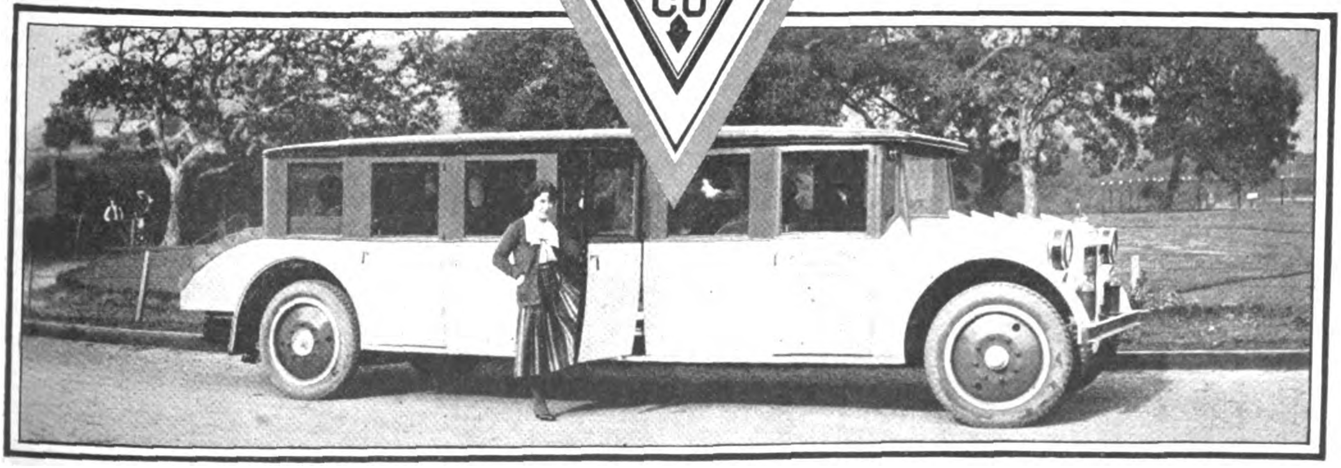

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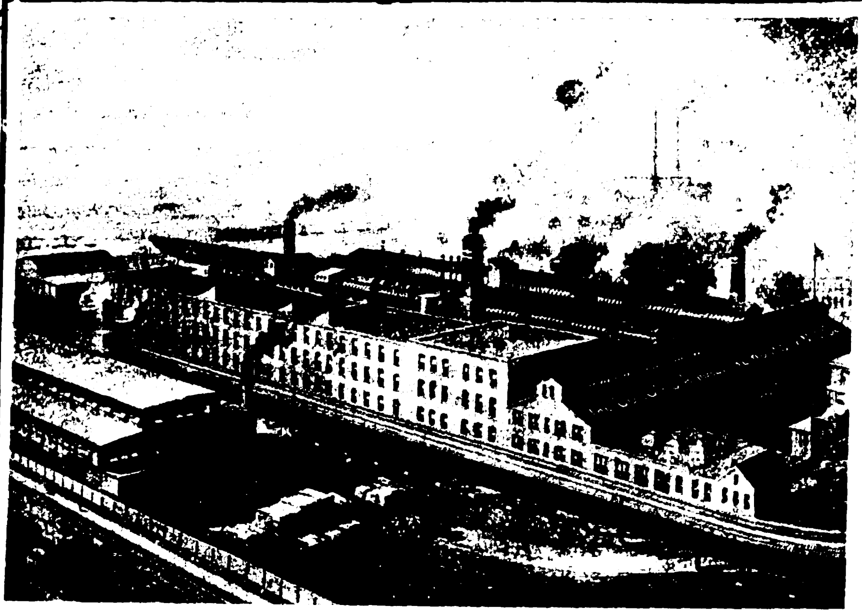

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- Controller Parts
- Trolley Wheels, Poles and Harps
- Destination Signs—Steel
- Center Plates—Dust Proof—Oil Lubricated
- Grid-Resistors, all types
- Motor Suspension Bars

RAILWAY MOTOR PARTS:
- Armature Bearing Shells—Malleable Iron and Semi-Steel
- Armature Bearings—Bronze
- Axle Bearing Shells—Malleable Iron and Semi-Steel
- Axle Bearings—Bronze
- Armature Coils
- Armature Shafts
- Bolts—for Motors and Trucks
- Brushholder Parts
- Brushholders Complete
- Commutators—all types
- Field Coil Terminals
- Field Coils
- Gear Cases—Malleable Iron and Sheet Steel, Welded or riveted

TRUCK PARTS:
- Brake Pins
- Brake Rigging
- Coupling Pins
- Equalizers
- Gusset Plates
- Journal Boxes
- Journal Box Covers
- Journal Box Shims
- Journal Brasses
- Journal Brass Wedges
- Journal Check Plates
- Turnbuckles

CASTINGS:
- Motor and Truck Spring Cap
- All kinds of Aluminum, Brass, Bronze, Cast Steel, Grey Iron, Malleable Iron, White Metal and Zinc Castings

DROP FORGINGS:
- Light, Medium and Heavy

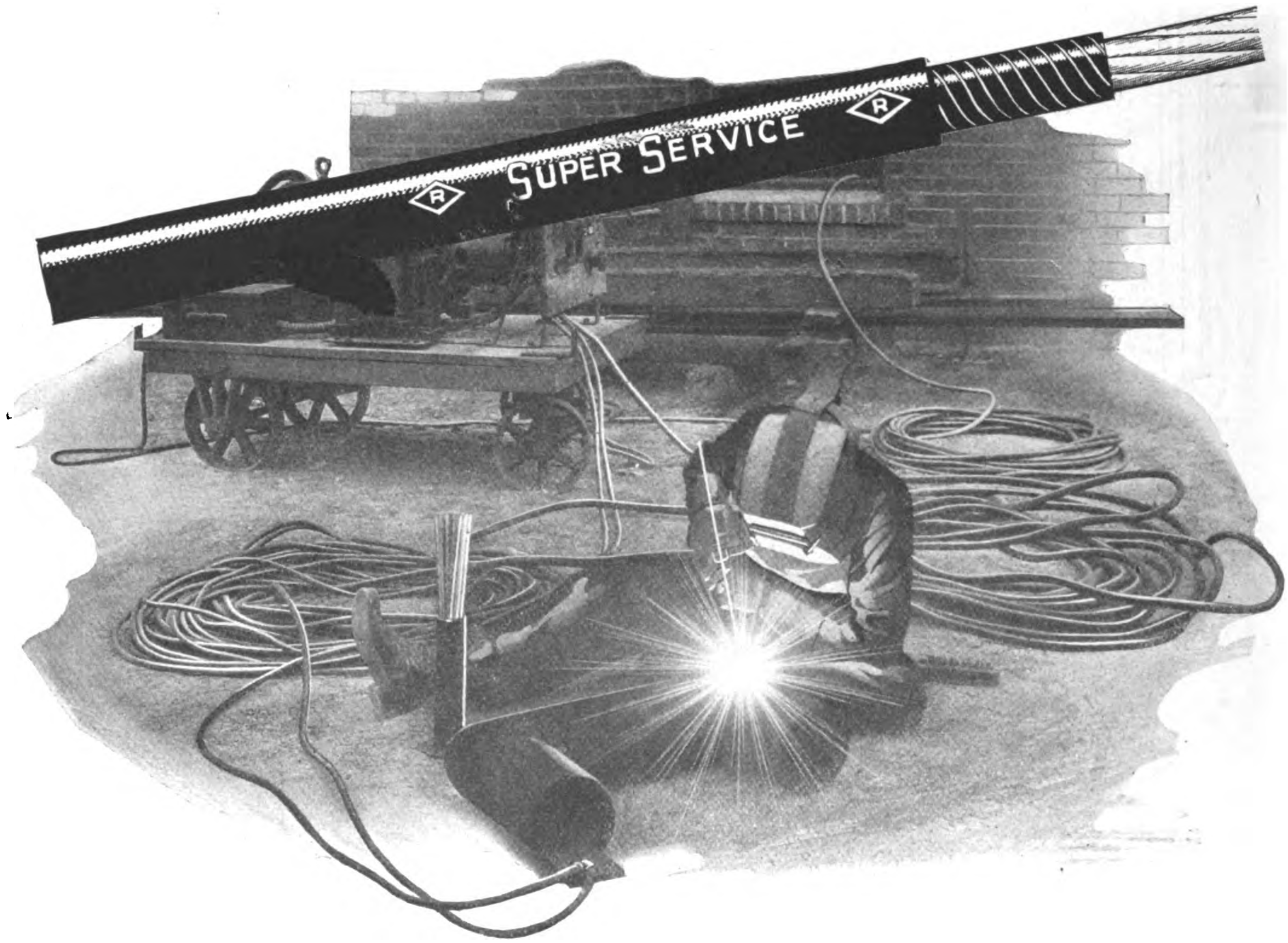
LINE MATERIAL:
- Feeder, Splicing and Trolley Ears

MACHINERY—REPAIR AND SHOPS:
- Armature, Bearing, Babbitting and Broaching Machines
- Armature Machine—Columbia Patent
- Armature Buggies
- Armature Lead Flattening Rolls
- Armature Shaft Straightener
- Armature Winding Stands
- Armature Coil and Taping Machine
- Axle Straightener
- Babbitting Moulds
- Banding and Heading Machine, and with Slotting Attachment
- Car Hoists—Electric
- Car Replacers
- Coil Taping Machine
- Coil Winding Machine
- Pinion Pullers and Repair Parts
- Pit Jack—Pneumatic
- Signal or Target Switches
- Tension Stands
- Freight Cars Rebuilt

3313 ATLANTIC AVE., BROOKLYN N. Y.

ROME WIRE

Super Service Welding Cable



for Railway Service:

Rome Super Service Welding Cable is but one of many Super Service Cords and Cables for Railway Service. Send for Samples, Data and Prices.

"Super Service"
Registered in
U. S. Patent Office

This new welding cable is of super flexibility and endurance. The conductor is built up of extremely fine copper wires, rope stranded, covered with a double layer of 60% High Grade Selected Rubber Sheets, vulcanized in steel moulds under tons of pressure. It handles easily and smoothly, cannot fray, does not chip or kink, is waterproof and highly resistant to oil, and withstands tremendous abuse. *Write to Dep.* "*B*" 2.

Rome Wire Company Mills and Executive Offices: Rome, New York

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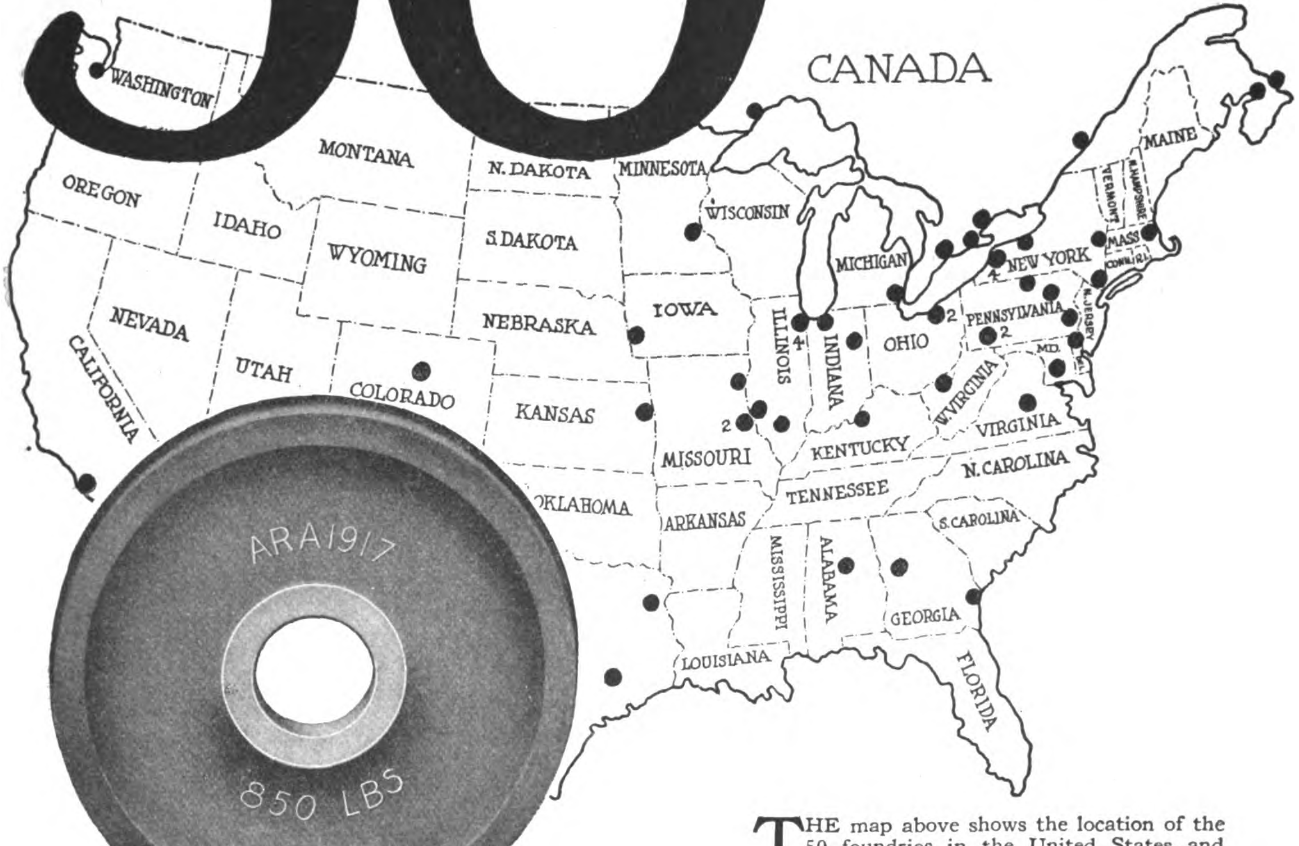
2143

WIRE=ROME

50 Delivery Points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CONN.
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2
4
2
2
4
ARA1917
850 LBS

THE map above shows the location of the 50 foundries in the United States and Canada, represented by the Association of Manufacturers of Chilled Car Wheels.

Chicago, 4
St. Louis, 2
Buffalo, 4
Pittsburgh, 2
Cleveland, 2
Amherst, N. S.
Montreal
Mich. City, Ind.
Louisville
Mt. Vernon, Ill.
Ft. Wayne, Ind.
Birmingham
Atlanta
Savannah
Boston
Detroit
St. Paul
Kansas City, Kan.
Denver
Tacoma
Rochester, N. Y.

Sayre, Pa.
Berwick, Pa.
Albany
Toronto
New Glasgow, N. S.
Madison, Ill.
Huntington, W. Va.
Wilmington, Del.
Houston, Tex.
Hannibal, Mo.
Reading, Pa.
Baltimore
Richmond, Va.
Ft. William, Ont.
St. Thomas
Hamilton
Ramapo, N. Y.
Marshall, Tex.
Los Angeles
Council Bluffs

CHILLED IRON WHEELS for railway and street car service. Capacity 20,000 per day. 25,000,000 in service.

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS
1847 McCormick Bldg., Chicago

American Railroad Association Standards

650 lb. wheel for	60,000 Capacity Cars
700 lb. wheel for	80,000 Capacity Cars
750 lb. wheel for	100,000 Capacity Cars
850 lb. wheel for	140,000 Capacity Cars

The Standard Wheel for Seventy-Two Years

CHILLED IRON WHEELS

An Anderson Sleet Cutter in time will save the line

Stock now—

In justice to yourself and your patrons, who do not always understand your winter troubles, be prepared for the day that the wire will be thick with ice and sleet.

Insurance against a sleet storms is a very small item when figured in terms of Anderson Sleet Wheels and Cutters.

Write today for quotation on your winter's supply

Albert & J. M. Anderson Mfg. Co.
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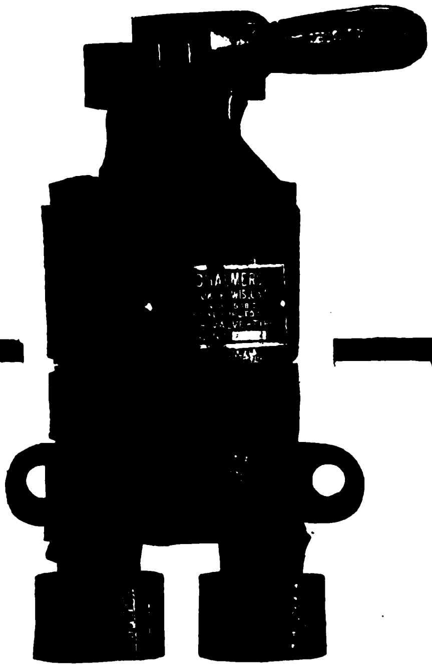
289-293 A St., Boston, Mass.

Branches—New York, 135 B'way. Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St. London, 12 Moor Lane E. C. 2.



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Type "C"

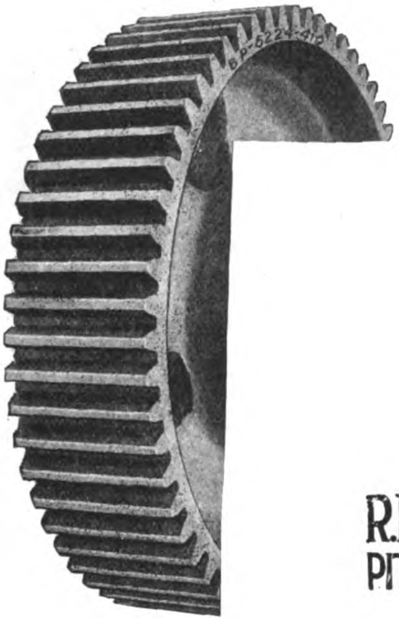
Engineers Valves for Air Brakes

This engineer's valve has been adopted by many important railways as STANDARD, regardless of the other equipment used. Several years of commercial application has demonstrated type "C" Engineer's Valve to be superior in every respect. A few important features are graduated application positively secured at service point—quick emergency point—graduated release, if desired—very quick release at full release point—no ground joints—simple design—valve can be completely dismantled and reassembled in two minutes by removing only two nuts—etc., etc.

500,000 service applications and releases at 90 lbs. pressure show no wear on the parts.

Send for Bulletin No. 1103A.

ALLIS-CHALMERS
MANUFACTURING COMPANY
MILWAUKEE, WISCONSIN. U.S.A.



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Can You Get This Guarantee With Any Other Gears, At Any Price?

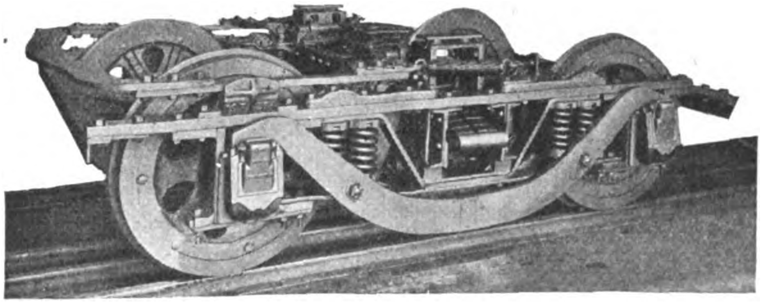
We guarantee Nuttall BP Gears to last four times as long as untreated gears in the same service, and that means a cost saving of about 70%. If they are Helical Gears, they will last still longer and greatly reduce motor maintenance.

Do you want a trial set?

R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

All Westinghouse Electric and Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

Chatter-Proof Brakes on all Baldwin Improved Motor Trucks For Electric Railways



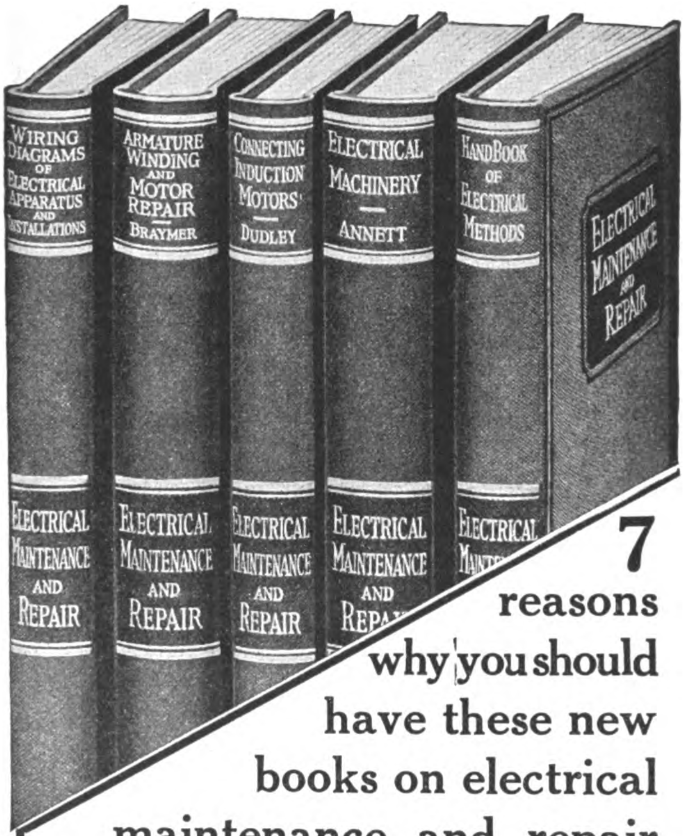
Baldwin Class "AA" Motor Truck, built for the Osaka Railway, Japan

AMONG the many notable features of Baldwin Electric Motor and Trailer trucks for high speed electric interurban and street railway service, are the brakes and the method of brake suspension. Internationally known as the simplest and best design of brake.

Baldwin Brakes are always to be depended upon

Baldwin representatives in all principal countries of the world.
Detailed information upon request.

THE BALDWIN LOCOMOTIVE WORKS
PHILADELPHIA, U. S. A. Cable Address, "Baldwin, Philadelphia"


WIRING DIAGRAMS OF ELECTRICAL APPARATUS AND INSTALLATIONS
ARMATURE WINDING AND MOTOR REPAIR
BRAYMER
CONNECTING INDUCTION MOTORS
DUDLEY
ELECTRICAL MACHINERY
ANNETT
HANDBOOK OF ELECTRICAL METHODS
ELECTRICAL MAINTENANCE AND REPAIR

7 reasons why you should have these new books on electrical maintenance and repair

1. The five books in this library discuss actual repair jobs and show you step by step what to do when anything goes wrong.
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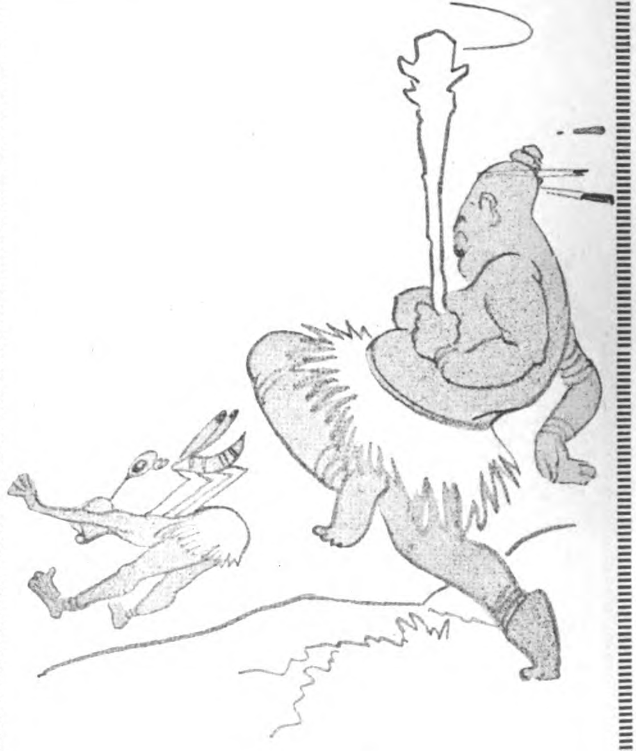
City and State..

Firm or Employer..

Occupation ....

E.R.J. 12-1-23



Inkubis

Inkubis is the locust of the Kaffir country—larger than the one we know—and more vicious.

It has a sharp hickey on its legs so that it draws blood when it kicks, and once it lights on you, it sticks with cootielike tenacity.

The man underneath it is in much the same fix as an operator who finally gets some mischosen brushes to actually work on a machine. He is afraid to touch them, fearing a kick-up that will spoil commutation—he is bewildered—he looks to the left, then to the right, you'd think he was working a Urelite.

His furtive question: "What to do?"

Well, what would *you* do if you had the list of addresses below?

Morganite Brush Co., Inc.

Main Office and Factory:
519 West 38th St., New York

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Philadelphia, Electric Power Equipment Corp., 412 North 18th St.
Baltimore, O. T. Hall, Sales Engineer, 1926 Edmondson Ave.
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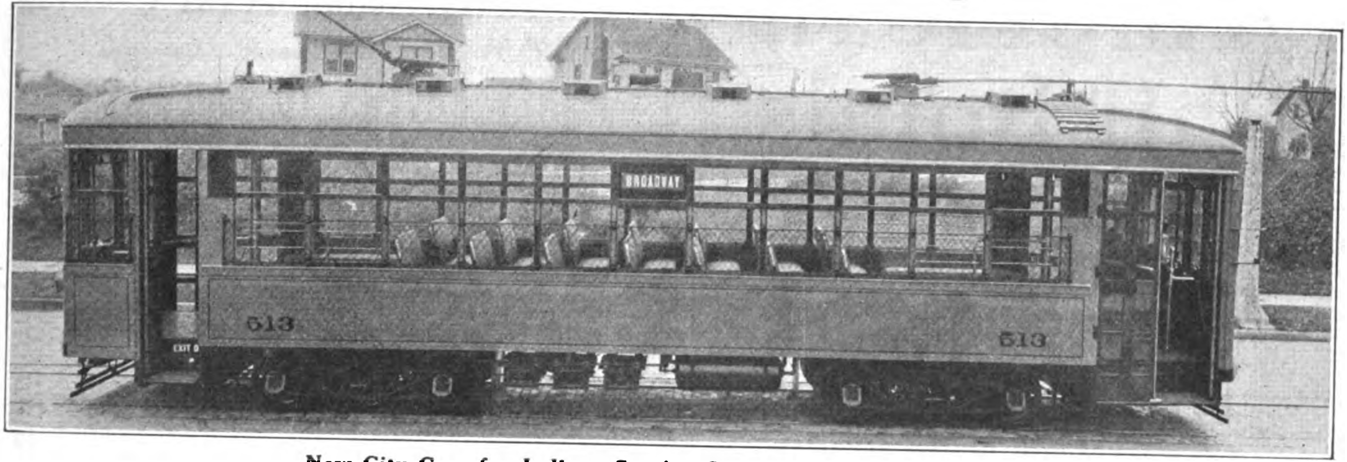
Los Angeles, Special Service Sales Co., 502 Delta Building.
San Francisco, Special Service Sales Co., 202 Russ Building.
Toronto, Can., Railway & Power Engineering Corp., Ltd., 131 Eastern Ave.

St. Louis Quality Cars



New City Cars for Indiana Service Corporation, Fort Wayne, Ind.

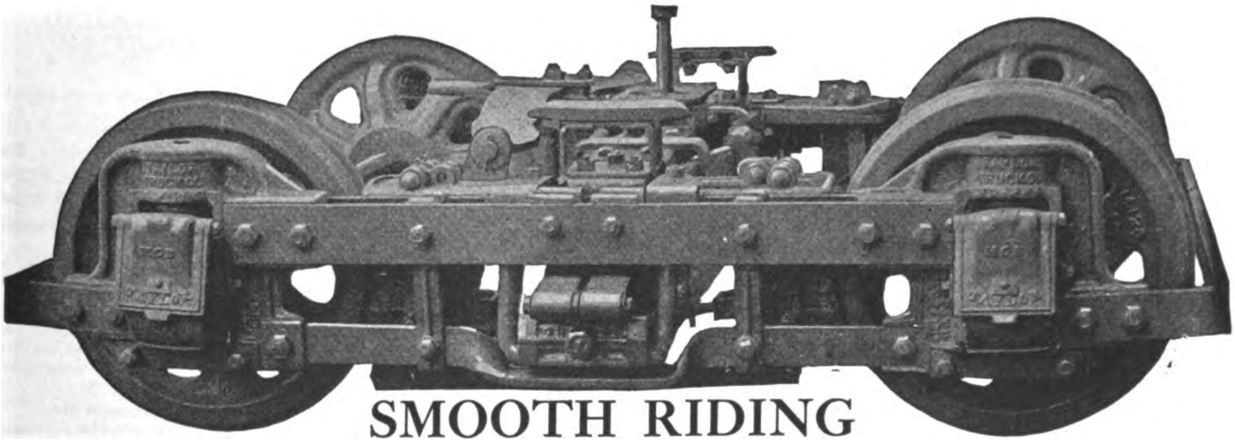
These new double-truck, one-man, front-entrance and exit cars are arranged with double selective-type doors at front to expedite loading; the exit is the rear door controlled from the motorman's position; there is a motorman's signal light in each vestibule connected with the rear exit-door.

These cars are 39 ft. 11 in. long over all with 2 ft. 4½ in. post spacing and seating capacity of 44 passengers. Trucks are St. Louis AM 64 diamond arch, bar type equipped with quadruple 25 H.P. motors.

St. Louis Car Company
St. Louis, Mo.
"The Birthplace of the Safety Car"

Further particulars sent upon request.

R. H.
TAYLOR REDUCED HEIGHT TRUCK
S. WITH A.
TAYLOR STRAIGHT ACTION BRAKE



SMOOTH RIDING
LOW MAINTENANCE COST—Absolute Safety
Center Plate Height 22¾ in. with 26 in. Diam. Wheels

For Modern Low Level Double Truck Cars, the Taylor R. H. Truck, equipped with Taylor S. A. Brake, with large diameter hard steel pins, will provide the best possible service results from every standpoint.

TAYLOR ELECTRIC TRUCK CO., TROY, N. Y.
SPECIFICATIONS ON REQUEST Established 1892 SEND FOR PORTFOLIO

American
Rail Bonds

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UNITED STATES
TWIN TERMINAL
SOLDER
TRIPLEX

Arc Weld and Flame Weld

Send for new
Rail Bond Book

American Steel & Wire Company
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BARBOUR-STOCKWELL CO.
205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of
Special Work for Street Railways
Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
Kerwin Portable Crossovers
Balkwill Articulated Cast Manganese Crossings

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AUTOMATIC SIGNAL
for single track block signal protection
United States Electric Signal Co.
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INSULATED WIRES AND CABLES
JOHN A. ROEBLING'S SONS CO., TRENTON, NEW JERSEY

International Creosoting
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Galveston, Texas
Plant—Texarkana Beaumont Galveston
MONEY SAVERS TO RAILWAYS
Treated railway ties, poles, piling,
bridge timbers, etc.
See our full page advertisement
in last week's issue.

High-Grade Track
Work
SWITCHES—MATES—FROGS—CROSSINGS
COMPLETE LAYOUTS
IMPROVED ANTI-KICK BIG-HEEL SWITCHES
HARD CENTER AND MANGANESE
CONSTRUCTION

New York Switch & Crossing Co.
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REG. U. S. PAT. OFF.
Electric Railway
Automatic
Signals
for Accessibility
and Reliability
EST. 1888 AIMco INC. 1916
"American"
INSULATING
MACHINERY
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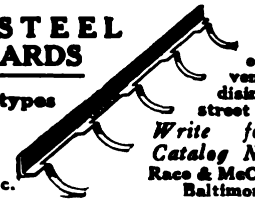
REG. U.S. PAT OFF
Philadelphia, New York, Paris, England
Sales Agents:
Electric Service Supplies Co.
Philadelphia New York Chicago



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PAVING GUARDS
Adapted to all types of rails and paving.
W. S. GODWIN CO., Inc.
Proven by service to economically prevent seepage and disintegration of street railway paving.
Write for Illustrated Catalog No. 20.
Race & McComas Sts.,
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Industry read the
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Every Week

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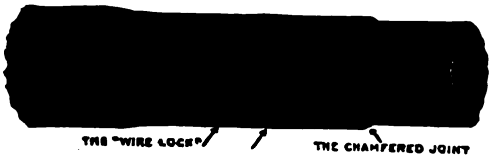
AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.
Boston, 176 Federal; Chicago, 112 W. Adams; Cincinnati, Traction Bldg.; New York, 100 E. 42nd St.

ELRECO TUBULAR POLES



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Lowest Cost
Lightest Weight
Least Maintenance
Greatest Adaptability
Catalog complete with engineering data sent on request
ELECTRIC RAILWAY EQUIPMENT CO.
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NewYork City, 30 Church Street

The Baker
Wood Preserving Company
CREOSOTERS
Washington Court House, Ohio

Cross Ties
Bridge Timbers
Lumber
Posts
Piling
Treated and Untreated

We solicit your inquiries

Creosoting Plant located
Washington Court House, Ohio
On—Penna. R.R., B. & O. R.R., D. T. & I. R.R.
Operating Mills in Southern Ohio

Shaw Lightning Arresters
Standard in the Electric Industries for 35 years
Henry M. Shaw
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DUNDEE "A" AND "B" FRICTION TAPES

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A
FRICTION TAPE
THE OKONITE COMPANY

are
Okonite
Products
'Nuff Said!

DUNDEE
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FRICTION TAPE
THE OKONITE COMPANY
PASSAIC, N.J.
U.S.A.

Write for Samples and Circulars
THE OKONITE CO., Passaic, N. J.
Incorporated 1884
Sales Offices: New York—Atlanta—San Francisco
Agents: Central Electric Co., Chicago, Ill.; Pettingell-Andrews Co., Boston, Mass.; The F. D. Lawrence Electric Co., Cincinnati, Ohio; Novelty Electric Co., Philadelphia, Pa.

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Automatic Signals
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Lapp Insulators
Lapp Insulator Co. Inc. Le Roy, N.Y.
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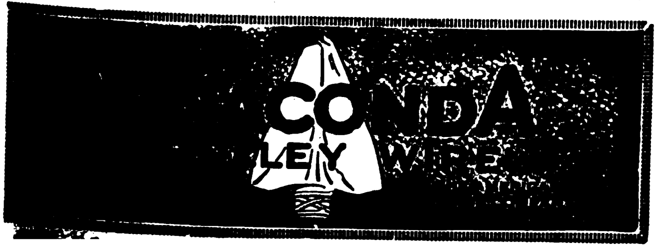
Standard Underground Cable Co.
Pittsburgh, Pa.
Manufacturers of
Copper, Brass, Bronze Wires, Rods, Tubes
Copper Clad Steel Wire
Insulated Wire of all kinds
Lead Covered and Armored Cables
Cable Terminals, Junction Boxes, etc.
Boston, Washington, Philadelphia, Pittsburgh, Seattle, Chicago, New York, Atlanta, San Francisco, Detroit, Los Angeles, St. Louis



Peirce Sign Hangers
For Span Wires
The hinged joint keeps the sign in position at all times, regardless of the twisting of the span wires.
HUBBARD & COMPANY
PITTSBURGH CHICAGO

THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

Builders since 1868 of Water Tube Boilers of continuing reliability

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CINCINNATI, Traction Building
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TUCSON, ARIZ., 21 So. Stone Avenue
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PORTLAND, ORE., 805 Gasco Building

WORKS
Bayonne, N. J.
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Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893

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Special Trackwork

For Street and Steam Railways

Steel Castings **Gas Cylinders**

ORIGINATORS OF

Manganese Steel Trackwork

WM. WHARTON JR. & CO., Inc.

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Other Plants:

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Series Type

Arc Welding and Bonding Outfit

Rugged series resistance coil
Indestructible Mica insulation
Normal welding current at half voltage

The Electric Railway Improvement Co.
Cleveland, Ohio

ERICO RAIL BONDS

Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY

Johnstown, Pa.

Sales Offices:

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Pacific Coast Representative:

United States Steel Products Company
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The Differential Car

An automatic dump car, an electric locomotive, a snow plow, and a freight car—all in one. Big savings shown in track construction and maintenance, paving work, coal hauling, ash disposal, snow removal, and freight transportation.

The Differential Steel Car Co.
Findlay, Ohio

RAMAPO AJAX CORPORATION

Ramapo Automatic Return Switch Stands for Passing Sidings

RACOR

RACOR Tee Rail Special Work.

Manganese Construction

GENERAL OFFICES: HILLBURN, NEW YORK

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Metal Safety Railway Tie Co.

522 North American Bldg., Philadelphia, Pa.

All-metal cross ties

Types for open and closed tracks

"More flexible than wood"

See advertisement, issue, Sept. 29, page 86.
Ask for circular on either type. *Prices upon application.*

BUCKEYE JACKS

High-grade R. R. Track and Car Jacks

The Buckeye Jack Mfg. Co.
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A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

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TRADE
HOPE
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MADE IN U.S.A.

The

Standard of Quality

The precise and delicate requirements of manufacturers of dynamos, magnetos and other electrical apparatus prescribe the use of electric tape that is known to be of constant high quality.

Quality is the sum total of good basic materials and careful manufacture—the best grades of yarn plus painstaking, skilled workmanship.

That is why thickness, width, weave, finish and absorption are uniformly correct in HOPE tapes. That is why, for 40 years, manufacturers of electrical apparatus have found HOPE products to be the Standard of Quality.

Let us send you the HOPE Sample Booklet of electric tape, so that you can pick out a tape to meet your own special requirements.

HOPE Electric Tape

HOPE WEBBING COMPANY, INC.
PROVIDENCE - RHODE ISLAND
New York Troy Chicago

Fare Registration on a Modern Basis

193
IN
THE INTERNATIONAL REGISTER CO.
CHICAGO
10224

Simple and accurate as the International method has always been the modern tendency in street railway practice toward automatic operation is reflected in the newest type registers, equipped with electric Backs, removing the last drag on the platform worker, and contributing to the quicker handling of traffic.

Registers made in various types to meet the requirements of service on Electric Railways.
Exclusive selling agents for HEEREN ENAMEL BADGES.

The International Register Co.
15 South Throop Street, Chicago, Illinois

Advertisements for the
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Wednesday

For issue out Saturday

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WOONSOCKET PLANT - ANCHOR WEBBING COMPANY - PAWTUCKET PL

Use only Awebco Tape on your Armatures
Field Coils have better protection when wound with "AWEBCO Tape." Send for samples.

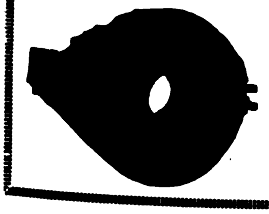
ANCHOR WEBBING COMPANY
300 Brook Street, Pawtucket, Rhode Island

FORD TRIBLOC

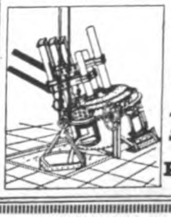
A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only block that carries a five-year guarantee.

FORD CHAIN BLOCK CO.
Second and Diamond Sts., Philadelphia

OXYGEN
FOR CUTTING, WELDING, ETC.
INTERNATIONAL OXYGEN COMPANY
NEWARK NEW YORK PITTSBURGH TOLEDO



CHILLINGWORTH
One-Piece Gear Cases
Seamless—Rivetless—Light Weight
Best for Service—Durability and Economy. Write Us.
Chillingworth Mfg. Co.
Jersey City, N. J.



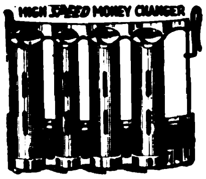
Moore Rapid Lectromelt Furnaces
Ten Standard Sizes ⅛ to 24 Tons Capacity
Most Rapid and efficient for making
Tool Steels, Alloy Steels, Forging Steels
Steel Castings, Malleable Iron, Grey Iron
Carbide, Ferro-Alloys etc.
PITTSBURGH ELECTRIC FURNACE CORPORATION
P.O. Box 1125. PITTSBURGH, PA.

An Independent Inspection Service
For Electric Railways

Embracing

Progressive Inspection of Cars, Rails, Track Fastenings, etc., from the raw material to the finished product. Our Bulletin No. 26 tells the story—*write for your copy.*

Pittsburgh Testing Laboratory
Inspecting Engineers and Chemists
Branch Offices in the Principal Cities **Pittsburgh, Pa.**



HIGH SPEED MONEY CHANGERS

1923 model—without rivets—ready for delivery

Supplied in one or four tube Combinations

Essential wherever the rapid and accurate handling of change is required. Now included in the standard equipment of largest Traction Companies because conductors demand them.

Prices and Literature sent on request

J. L. GALEF, 75 Chambers St., N. Y. C.
Exclusive Manufacturer's Selling Agent

Fare Boxes *Change Carriers*

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COUNTERS SORTERS WRAPPERS

THE CLEVELAND FARE BOX CO.
CLEVELAND, OHIO
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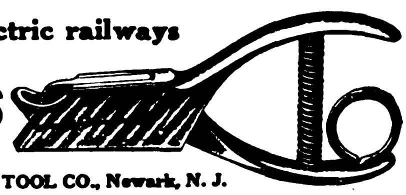
ELECTRIC CAR HEATERS
THERMOSTATS BUZZERS
PNEUMATIC DOOR OPERATORS
CONSOLIDATED CAR-HEATING CO.
NEW YORK
ALBANY, N.Y.
CHICAGO

Car Heating and Ventilation

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment Now is the time to get your cars ready for next winter. Write for details.

The Peter Smith Heater Company
6209 Hamilton Ave., Detroit, Mich.



75% of the electric railways
use

B-V Punches

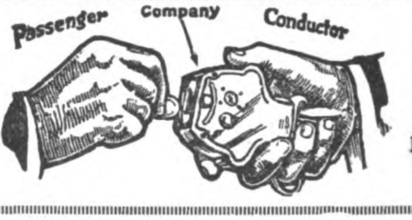
Send for Catalog

BONNEY-VEHSLAGE TOOL CO., Newark, N. J.

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED

No. 478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.



Direct Automatic Registration By the Passengers

Rooke Automatic Register Co.
Providence, R. I.

PROVIDENCE **H-B**
FENDERS **LIFE GUARDS**

The Consolidated Car Fender Co., Providence, R. I.
Wendell & MacDuffie Co., 110 E. 42nd St., New York
General Sales Agents

Heywood-Wakefield

CAR SEATS

of pressed Steel for all Classes of Passenger Service. Rattan for covering seats and for snow sweepers.

HEYWOOD-WAKEFIELD CO.
Factory at Wakefield, Mass.
Offices at New York, Chicago, San Francisco

For detailed description—see—CAR BUILDERS CYCLOPEDIA 1922 Edition

"Boyerized" Products Reduce Maintenance

Bemis Trucks	Manganese Brake Heads
Case Hardened Brake Pins	Manganese Transom Plates
Case Hardened Bushings	Manganese Body Bushings
Case Hardened Nuts and Bolts	Bronze Axle Bearings

Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

Bemis Car Truck Co., Springfield, Mass.

HALE-KILBURN
CAR SEATS

For Every Class of Service

General Offices and Works: Philadelphia
Offices: New York, Chicago, St. Louis, Washington, San Francisco

B. A. Hegeman, Jr., President
Charles C. Castle, First Vice-President
Harold A. Hegeman, Vice-President, Treas. and Acting Sec'y
W. C. Lincoln, Manager Sales and Engineering

National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., N. Y.

BRANCH OFFICES:

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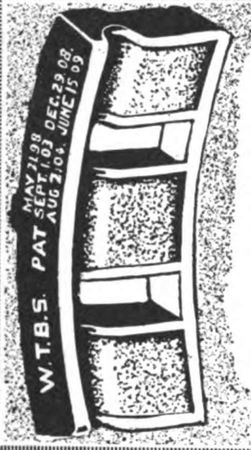
- Anglo-American Varnish Co., Varnishes, Enamels, etc.
- National Hand Holds
- Drew Line Material & Railway Specialties
- Genesco Paint Oils
- Turnstile Car Corporation—Turnstiles
- Economy Electric Devices Co.
- Power Saving and Inspection Meters
- Fort Pitt Spring & Mfg. Co., Springs
- C-H Electric Heaters
- Garland Ventilators
- E-Z Car Control Corp. Safety Devices
- Lind Aluminum Field Coils
- Flaxlinum Insulation
- National Safety Car Equipment Co.'s One-Man Safety Cars
- Anderson Slack Adjusters


W.T.B.S. PAT
MAY 21.98 DEC.29.08.
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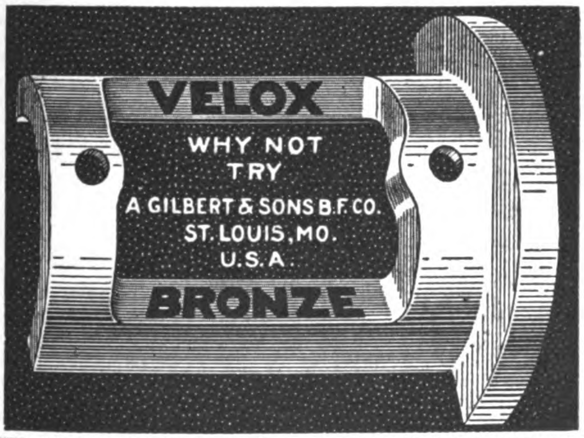
Defective Wheels Corrected While They Run

WHEEL TRUING BRAKE SHOES

—keep your cars and wheels in service. Abrasive blocks in various sections correct flattening or wear on any part of flange or tread. Write for booklet.

Wheel Truing Brake Shoe Co.
Detroit, Mich.

Trade Mark—Wheel Truing Brake Shoe



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100 New Users in the Last Nine Months

KASS SAFETY TREADS

HIGH
in efficiency and lasting qualities
LOW
in weight, initial and upkeep costs

Morton Manufacturing Co., Chicago

Only reliable products can be continuously advertised

Ohmer Indicating and Recording Fare Registers

are especially well adapted for use in one-man cars, either for city or interurban service.

The operation is quick and snappy. Each fare is clearly indicated and a correct printed record made of it.

Ohmer Fare Registers offer the only means of placing fare collecting on an absolutely correct business basis.

OHMER FARE REGISTER CO.
Dayton, Ohio

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

STEEL
'CARNEGIE'

"OSKELITE"

The Stop Light for street cars. Operates from brake system. Details on request

The Oskel Equipment Co.
940 McCormick Bldg., Chicago, Ill.

Brake Shoes A.E.R.A. Standards

Diamond "S" Steel Back is the Best Type

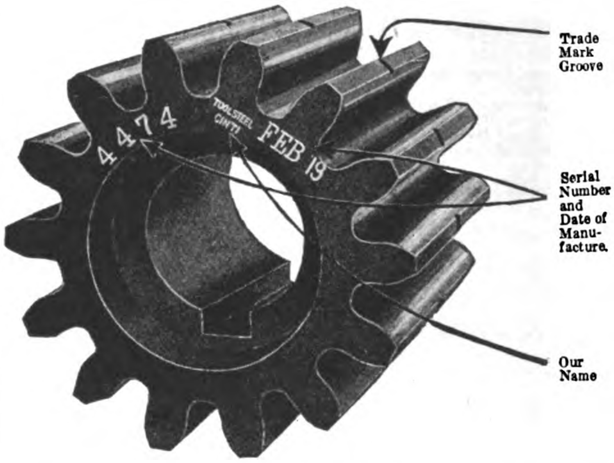
Standard Patterns for

SAFETY CAR

D-67 for Narrow Treads
D-87 for Wide Treads

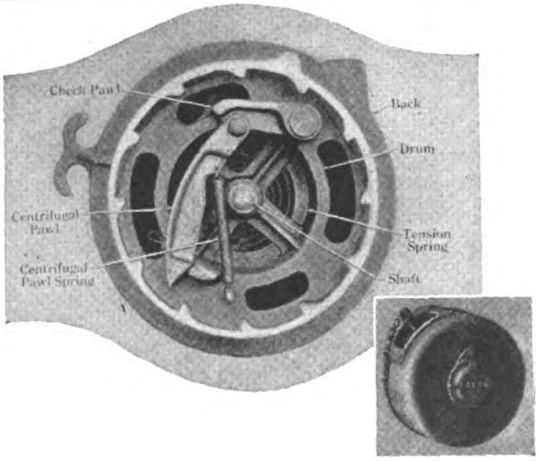
American Brake Shoe and Foundry Co.
30 Church Street, New York
332 So. Michigan Ave., Chicago Chattanooga, Tenn.

Cincinnati "Tool Steel" Quality marks.


Trade Mark Groove
4474
TOOL STEEL CIN'TI
FEB 19
Serial Number and Date of Manufacture
Our Name

Even when greasy you can tell "Tool Steel" by the groove.

The Tool Steel Gear and Pinion Co.
CINCINNATI, O.


Check Pawl
Back
Drum
Centrifugal Pawl
Tension Spring
Centrifugal Pawl Spring
Shaft

Ever stop your watch by winding it?

Overwinding will put the average retriever or catcher out of action. Added maintenance expense.

EARLL
Catchers and Retrievers

cannot be overwound. The one-piece tension spring maintains steady even tension throughout long years of service. It requires a minimum of winding effort, saving time, avoiding delays.

This and four other exclusive Earll Catcher and Retriever Features are vitally important. Get the whole story.

C. I. Earll York, Pa.

Griffin Wheel Company

McCormick Building
Chicago, Ill.

GRIFFIN F. C. S. WHEELS

For Street and Interurban Railways

FOUNDRIES:

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Detroit
Denver

Boston
Kansas City
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SEARCHLIGHT SECTION

USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

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Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

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1 to 3 inches	$4.50 an inch
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Rates for larger spaces, or yearly rates, on request.

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

E.R.J.

POSITIONS VACANT

COMPETENT Division Superintendent wanted on large Ohio property. Give full outline of experience, references, and salary desired in first letter. P-627, Elec. Railway Journal, Leader-News Bldg., Cleveland, Ohio.

DRAFTSMEN-COMPUTERS wanted on railway trackwork working knowledge of and facility in trigonometry essential. State in letter, age, education, experience and approximate salary. Employment Dept., Bethlehem Steel Co., Steelton, Pa.

FIRST-CLASS trolley lineman wanted. One with railway sub-station experience preferred. Must be well recommended. In reply give experience, references and salary expected. R. S. Thomas, Engineer, Arkansas Valley Interurban Railway Company, Wichita, Kansas.

ROADMASTER wanted for electric road in the East. Must be thoroughly efficient in the handling of material and labor and competent in the maintenance of city and interurban track. State experience, salary expected and when available. P-622, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

POSITIONS WANTED

ELECTRIC arc welder, experienced in joint welding, bonding and surface work. Can furnish good references. Open for immediate employment. PW-618, Elec. Ry. Journal, Leader-News Bldg., Cleveland, Ohio.

ENGINEER of equipment, technical graduate, with several years' experience. PW-623, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

MASTER MECHANIC city or interurban railway experienced on all branches. 14 years' experience. PW-619, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

POSITION wanted, with small road in Penna. or N. Y., as working barn foreman or general repair work. With chance of promotion. Twenty-six years old, eight years' experience. Reference. PW-614, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

POSITIONS WANTED

WANTED position by master mechanic, 18 years' electric railway maintenance, rebuilding cars, track, trolley and rewinding armatures. Best of reference. PW-620, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

Three Electric Cars

New cars still in the shop, modern in every way, 45 passengers, standard gauge, designed for interurban service in Cuba, each equipped with two G. E. 50 hp. motors for D.C. 1200 v. Acquired by judgment. We will sell cheap.

The Davison Chemical Company
Garrett Building, Baltimore

FOR SALE

320 LEWIS & FOWLER FARE REGISTERS

FS-626, Electric Railway Journal
10th Ave. at 36th St., New York City.

FOR SALE

MOTORS

36—68 or 68 C.

In Perfect Condition

THE S. SNYDER CORPORATION
14 Mart Place, Rochester, N. Y.

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EARCHLIGHT
ERVICE
ECURES
ATISFACTORY
ALES

2004

Good Relaying Rails

Are as Serviceable as New Rails, with a Big Saving on the Price

We have ready for prompt shipment First-Class Relaying Rails in various weights. Get in touch with us, stating what weight rail and tonnage desired, and we will submit quotations.

HYMAN-MICHAELS COMPANY
531 Peoples Gas Bldg., Chicago

OFFICES AND PLANTS AT
St. Louis, Mo. Detroit, Mich.
Pittsburgh, Pa.
1324 Woolworth Bldg., New York City.
San Francisco, Cal. McKees Rocks, Pa.

FOR SALE

50—G. E. No. 80-A Motors.
50—Controllers, K-28-B; K-12.
35—B-2 Compressors.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

RAILS

Cars, Locomotives, Tanks, Steel Piling
Fairbanks-Morse standard gage Gasoline Motor Car; seats 34 people.

ZELNICKER IN ST. LOUIS

SNOW PLOW

1—Double truck express car with snow plow ends. Operated by air. Brill truck. Complete equipment overhauled.

TRANSIT EQUIPMENT CO.
501 Fifth Ave., New York

The "Searchlight Advertising" in this Paper

is read by men whose success depends upon thorough knowledge of means to an end—whether it be the securing of a good second-hand piece of apparatus at a moderate price, or an expert employee.

THE BEST PROOF

of this is the variety of this journal's Searchlight ads. Without a constant and appreciable *demand* for such machinery or services, by its readers, the market place which these advertisements represent could not exist for any length of time.

Are *you* using the Searchlight Section?

0318

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Receivers, Aftercoolers
Ingersoll-Rand Co.

Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Armature Shop Tools
Elec. Service Supplies Co.

Automatic Return Switch Stand
Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

Axles
Bemis Car Truck Co.
St. Louis Car Co.

Axles, Bus
Timken-Detroit Axle Co.

Axle Straighteners
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
Elec. Service Supplies Co.
International Register Co., The

Barges, Steel
Amer. Bridge Co.

Batteries, Dry
Nichols-Lintern Co.

Bearings and Bearing Metals
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
A. Gilbert & Sons, B. F. Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

Bearings, Center and Roller Side
Baldwin Locomotive Wks.
Stucki Co., A.

Bearings, Roller
Stafford Roller Bearing Car Truck Corp.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Heating Co.
Elec. Service Supplies Co.

Benders, Rail
Railway Track-work Co.

Boiler Tubes
Nat'l Tube Co.

Boilers
Babcock & Wilcox Co., The

Bond Testers
Amer. Steel & Wire Co.
Elec. Service Supplies Co.

Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Railway Track-work Co.

Bonds, Rail
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse Elec. & M. Co.

Book Publishers
McGraw-Hill Co.

Brackets and Cross Arms (See also Poles, Ties, Posts etc.)
American Bridge Co.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
Nat'l Ry. Appliance Co.
Westinghouse Tr. Br. Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Taylor Electric Truck Co.
Wheel Truing Brake Shoe Co.

Brakes, Brake Systems and Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Taylor Electric Truck Co.
Westinghouse Tr. Br. Co.

Bridges & Buildings
American Bridge Co.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Morganite Brush Co., Inc.
Westinghouse Elec. & M. Co.

Brushes, Graphite
Morganite Brush Co., Inc.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Brushes, Wire Pneumatic
Ingersoll-Rand Co.

Bunkers, Coal
American Bridge Co.

Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.

Cables (See Wires and Cables)

Cambric Tapes, Yellow & Black Varnish
Irvington Varnish & Ins. Co.

Carbon Brushes (See Brushes, Carbon)

Car Lighting Apparatus
Elec. Service Supplies Co.

Car Panel Safety Switches
Consolidated Car Heating Co.
Westinghouse Elec. & M. Co.

Cars, Dump
Differential Steel Car Co., Inc.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

Cars, Gas Rail
St. Louis Car Co.

Cars, Passenger, Freight Express, etc.
American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand
Davison Chemical Co., The
Electric Equipment Co.
Transit Equipment Co.

Cars, Self-Propelled
General Electric Co.

Castings, Brass, Composition or Copper
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.

Castings, Funnel
Wharton, Jr. & Co., Inc., Wm.

Castings, Gray Iron and Steel
American Bridge Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Wharton, Jr., & Co., Inc., Wm.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.

Catchers and Retrievers, Trolley
Earll, C. I.
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Catenary Construction
Archbold-Brady Co.

Ceiling, Car
Pantasote Co., The

Change Carriers
Cleveland Fare Box Co.
Galef, J. L.

Circuit Breakers
General Electric Co.
Westinghouse Elec. & M. Co.

Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. M. & J. M.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
WestinghouseElec . & M. Co.

Cleaners and Scrapers, Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
Ohio Brass Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coils, Armature and Field
Columbia M. W. & M. I. Co.
Economy Elec. Devices Co.
General Electric Co.

Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines
Cleveland Fare Box Co.
Galef, J. L.
International Register Co. The

Coin Sorting Machines
Cleveland Fare Box Co.
Galef, J. L.

Coin Wrappers
Cleveland Fare Box Co.
Galef, J. L.

Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Elec'l Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.

Compressors, Air, Portable
Ingersoll-Rand Co.

Compressors, Gas
Ingersoll-Rand Co.

Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll Rand Co.
Westinghouse Elec. & M. Co.

Condensor Papers
Irvington Varnish & Ins. Co.

Conduits, Underground
Std. Underground Cable Co.

Connectors, Solderless
Westinghouse Elec. & M. Co.

Connectors, Trailer Car
Consolidated Car Heating Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Controllers or Parts
Allis-Chalmers Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Controller Regulators
Electric Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse Elec. & M. Co.

Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Conveying and Hoisting Machinery
Columbia M. W. & M. I. Co.

Copper Wire
Anaconda Copper Mining Co.
Rome Wire Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roeblings Sons Co., John A.
Samson Cordage Works

Cord Connectors and Couplers
Electric Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Cranes
Allis-Chalmers Mfg. Co.

Cross Arms (See Brackets)

Crossings
Ramapo Ajax Corp.

Crossing Foundations
International Steel Tie Co.

Crossing Frogs and Switches
Ramapo Ajax Corp.
Wharton, Jr., & Co.,Inc.,Wm.

Crossings, Manganese
Indianapolis Switch & Frog Co.
Ramapo Ajax Corp.

Crossing Signals .See Signal Systems, Highway Crossing)

Crossings, Track, (See Track, Special Work)

Crossings, Trolley
Ohio Brass Co.

Crushers, Rock
Allis-Chalmers Mfg. Co.

Curtains and Curtain Fixtures
Brill Co., The J. G.
Edward Co., Inc., The O. M.
Electric Service Supplies Co.
Morton Mfg. Co.
Pantasote Co., The

Dealers' Machinery
Electric Equipment Co.
Transit Equipment Co.

Derailing Switches, Tee Rail
Ramapo Ajax Corp.

Destination Signs
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Detective Service
Wish Service, P. Edward

Door Operating Devices
Consolidated Car Heating Co.
National Pneumatic Co., Inc.

Doors and Door Fixtures
Brill Co., The J. G.
General Electric Co.
Hale & Kilburn Corp.
St. Louis Car Co.

Doors, Folding Vestibule
National Pneumatic Co., Inc.

Draft Rigging, (See Couplers)

Drills, Rock
Ingersoll-Rand Co.

Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.
Ingersoll-Rand Co.
Ohio Brass Co.

Dryers, Sand
Electric Service Supplies Co.

Ears
Ohio Brass Co.

Electric Grinders
Railway Track-work Co.

Electrodes, Carbon
Indianapolis Switch & Frog Co.
Railway Track-work Co.

Electrodes, Steel
Indianapolis Switch & Frog Co.
Railway Track-work Co.

Electrical Wires and Cables
American Elec. Works
Roeblings Sons Co., J. A.

Enamels
Beckwith-Chandler Co.

Engineers, Consulting, Contracting and Operating
Allison & Co., J. E.
Archbold-Brady Co.
Arnold Co., The
Beeler, John A.
Bibbens, J. Rowland
Buchanan & Laying
Byllesby & Co., H. M.
Day & Zimmerman, Inc.
Drum & Co., A L.
Feustel, Robert M.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelly Cooke & Co.
Ong, Joe R.
Parsons, Klapp, Brinkerhoff & Douglas
Richey, Albert S.
Sanderson & Porter
Shaw, Henry M.
Stevens & Wood, Inc.
Stone & Webster
Wortham, Edwin

Engineers, Inspecting & Chemists'
Pittsburgh Testing Lab.

Engines, Gas, Oil and Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse Elec. & M. Co.

Expansion Joints, Track
Wharton, Jr., & Co., Inc., Wm.

Fare Boxes
Cleveland Fare Box Co.
Economy Elec. Devices Co.
Galef, J. L.
Nat'l Ry. Appliance Co.
Ohmer Fare Register Co.

Fences, Woven Wire and Fence Posts
Amer. Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Consolidated Car Fender Co.
Electric Service Sup. Co.
Star Brass Works

Fibre and Fibre Tubing
Westinghouse Elec. & M. Co.

Field Coils (See Coils)

Flangeway Guards
Godwin Co., Inc., W. S.

Flaxlinum Insulation
Nat'l Ry. Appliance Co.

Floodlights
Electric Service Sup. Co.

Forgings
Carnegie Steel Co.
Columbia M. W. & M. I. Co.

Frogs & Crossings, Tee Rail
Ramapo Ajax Corp.

Frogs, Track. (See Track Work)

Frogs, Trolley
Ohio Brass Co.

Furnaces, Electric
American Bridge Co.
Pittsburgh Electric Furnace Corp

Fuses and Fuse Boxes
Columbia M. W. & M. I. Co.
Consolidated Car Heating Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Fuses, Refillable
Columbia M. W. & M. I. Co.
General Electric Co.

Gaskets
Westinghouse Tr. Br. Co.

Gas-Electric Cars
General Electric Co.

Gas Producers
Westinghouse Elec. & M. Co.

Gates, Car
Brill Co., The J. G.

Gear Blanks
Carnegie Steel Co.

Gear Cases
Chillingworth Mfg. Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Westinghouse Elec. & M. Co.

Gears and Pinions
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
General Electric Co.

Generators
Allis-Chalmers Mfg. Co.
English Electric Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Girder Rails
Lorain Steel Co., The

Goggles, Safety
Indianapolis Switch & Frog Co.

Gongs (See Bells and Gongs)

Greases (See Lubricants)

Grinders and Grinding Supplies
Indianapolis Switch & Frog Co.
Railway Track-work Co.

Grinders, Portable
Railway Track-work Co.

Grinders, Portable Electric
Railway Track-work Co.

Grinding Blocks and Wheels
Railway Track-work Co.

Guard Rail Clamps
Ramapo Ajax Corp.

Guard Rails, Tee Rail & Manganese
Ramapo Ajax Corp.

Guards, Cattle
American Bridge Co.

Guards, Trolley
Electric Service Sup. Co.
Ohio Brass Co.

Hammers, Pneumatic
Ingersoll-Rand Co.

Harps, Trolley
Anderson M. Co., A. & J. M.
Electric Service Sup. Co.
Nuttall Co., R. D.
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Headlining
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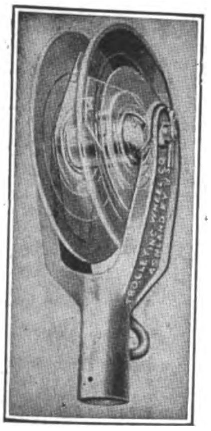

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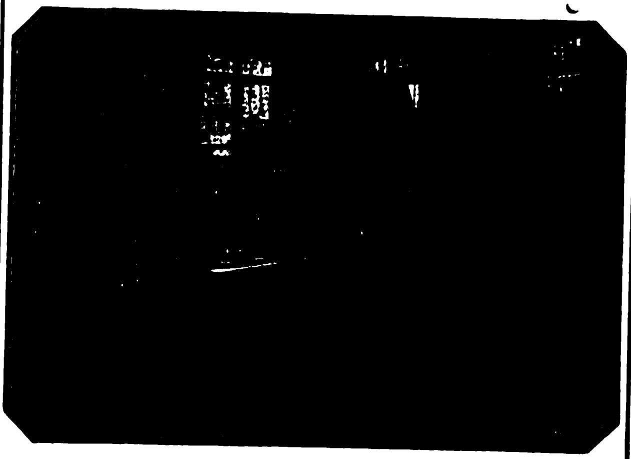

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  - Smith Heater Co., Peter
- **Heaters, Car, Hot Air and Water**
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  - Smith Heater Co., Peter
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  - Railway Track-work Co.
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  - Ford Chain-Block Co.
- **Hoists, Portable**
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  - Ohio Brass Co.
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  - Allis-Chalmers Mfg. Co.
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  - Nichols-Lintern Co.
  - Oskel Equipment Co.
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  - General Electric Co.
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  - General Electric Co.
  - Hope Webbing Co.
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  - Standard Underground Cable Co.
  - Westinghouse E. & M. Co.
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  - Amer. Ins. Machinery Co.
- **Insulating Silk**
  - Irvington Varnish & Ins. Co.
- **Insulation (See also Paints)**
  - Anderson M. Co., A. & J. M.
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  - Electric Service Sup. Co.
  - General Electric Co.
  - Irvington Varnish & Ins. Co.
  - Okonite Co.
  - Westinghouse Elec. & M. Co.
- **Insulators (See also Line Material)**
  - Anderson M. Co., A. & J. M.
  - Electric Ry. Equipment Co.
  - Electric Service Sup. Co.
  - Irvington Varnish & Ins. Co.
  - Ohio Brass Co.
  - Westinghouse Elec. & M. Co.
- **Insulator Pins**
  - Electric Service Sup. Co.
  - Hubbard & Co.
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  - Lapp Insulator Co., Inc.
- **Insulation, Slot**
  - Irvington Varnish & Ins. Co.
- **Insulating Varnishes**
  - Irvington Varnish & Ins. Co.
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  - Travellers Insurance Co.
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  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
  - National Ry. Appliance Co.
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  - Brill Co., The J. G.
- **Junction Boxes**
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  - Electric Service Sup. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
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  - Anderson M. Co., A. & J. M.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Lamps, Signal and Marker**
  - Nichols-Lintern Co.
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  - Nichols-Lintern Co.
- **Lightning Arresters**
  - Shaw, Henry M.
- **Lightning Protection**
  - Anderson M. Co., A. & J. M.
  - Electric Service Sup. Co.
  - General Electric Co.
  - Ohio Brass Co.
  - Westinghouse Elec. & M. Co.
- **Line Material (See also Brackets, Insulators, Wires, Etc.)**
  - Anderson M. Co., A. & J. M.
  - Archbold-Brady Co.
  - Columbia M. W. & M. I. Co.
  - Electric Ry. Equipment Co.
  - Electric Service Sup. Co.
  - English Electric Co.
  - General Electric Co.
  - Hubbard & Co.
  - Westinghouse Elec. & M. Co.
- **Locking Spring Boxes**
  - Wharton, Jr. & Co., Inc., Wm.
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  - Baldwin Locomotive Wks.
  - General Electric Co.
  - Westinghouse Elec. & M. Co.
- **Lubricating Engineers**
  - Galena-Signal Oil Co.
  - Texas Co.
  - Universal Lubricating Co.
- **Lubricants, Oil and Grease**
  - Galena Signal Oil Co.
  - Texas Co.
  - Universal Lubricating Co.
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- **Machine Tools**
  - Columbia M. W. & M. I. Co.
- **Manganese Parts**
  - Bemis Car Truck Co.
- **Manganese Steel Guard Rails**
  - Ramapo Ajax Corp.
- **Manganese Steel, Special Track Work**
  - Indianapolis Switch & Frog Co.
  - Wharton, Jr., & Co., Inc., Wm.
- **Manganese Steel Switches, Frogs and Crossings**
  - Ramapo Ajax Corp.
- **Meters, Car Watt-Hour**
  - Economy Elec. Devices Co.
- **Motor Buses**
  - (See Buses, Motor)
- **Motormen's Seats**
  - Brill Co., The J. G.
  - Electric Service Sup. Co.
  - St. Louis Car Co.
  - Wood Co., Chas. N.
- **Motors, Electric**
  - Allis-Chalmers Mfg. Co.
  - General Electric Co.
  - Westinghouse Elec. & M. Co.
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  - General Electric Co.
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  - Allis-Chalmers Mfg. Co.
  - Barbour-Stockwell Co.
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
  - Hubbard & Co.
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  - International Oxygen Co.
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  - Beckwith-Chandler Co.
- **Paints and Varnishes for Woodwork**
  - Beckwith-Chandler Co.
  - National Ry. Appliance Co.
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  - Ingersoll-Rand Co.
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  - Godwin Co., Inc., W. S.
- **Paving Material**
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  - Ohio Brass Co.
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  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
  - General Electric Co.
  - Wood Co., Chas. N.
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- **Pins, Case Hardened, Wood and Iron**
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  - Electric Service Sup. Co.
  - Ohio Brass Co.
  - Westinghouse Tr. Br. Co.
- **Pipe**
  - National Tube Co.
- **Pipe Fittings**
  - Westinghouse Tr. Br. Co.
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- **Plates for Tee Rail Switches**
  - Ramapo Ajax Corp.
- **Pliers, Rubber Insulated**
  - Electric Service Sup. Co.
- **Pneumatic Tools and Accessories**
  - Ingersoll-Rand Co.
- **Pole Line Hardware**
  - Ohio Brass Co.
- **Pole Reinforcing**
  - Drew Elec. & Mfg. Co.
  - Hubbard & Co.
- **Poles, Metal Street**
  - Electric Ry. Equip. Co.
  - Hubbard & Co.
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  - Bell Lumber Co.
  - International Creosoting & Construction Co.
- **Poles, Ties, Posts, Piling and Lumber**
  - Baker Wood Preserving Co.
  - Bell Lumber Co.
  - International Creosoting & Construction Co.
- **Poles, Trolley**
  - Anderson M. Co., A. & J. M.
  - Columbia M. W. & M. I. Co.
  - National Tube Co.
  - Nuttall Co., R. D.
- **Poles, Tubular Steel**
  - Elec. Ry. Equip. Co.
  - Electric Service Sup. Co.
  - National Tube Co.
- **Porcelain, Special High Voltage**
  - Lapp Insulator Co.
- **Potheads**
  - Okonite Co.
- **Power Saving Devices**
  - Economy Elec. Devices Co.
  - Nat'l Ry. Appliance Co.
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  - General Electric Co.
  - Westinghouse Elec. & M. Co.
- **Pumps**
  - Allis-Chalmers Mfg. Co.
  - Ingersoll-Rand Co.
- **Pumps, Vacuum**
  - Ingersoll-Rand Co.
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  - Bonney-Vehslage Tool Co.
  - International Register Co., The
  - Wood Co., Chas. N.
- **Rail Braces and Fastenings**
  - Ramapo Ajax Corp.
- **Rail Joints**
  - Carnegie Steel Co.
- **Rail Joints, Welded**
  - Indianapolis Switch & Frog Co.
- **Rail Grinders (See Grinders)**
- **Railway Paving Guards Steel**
  - Godwin Co., Inc., W. S.
- **Railway Safety Switches**
  - Consolidated Car Heating Co.
  - Westinghouse Elec. & M. Co.
- **Railway Welding (See Welding Processes)**
- **Rattan**
  - Brill Co., The J. G.
  - Electric Service Sup. Co.
  - Hale-Kilburn Co.
  - Heywood-Wakefield Co.
  - St. Louis Car Co.
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  - Brill Co., The J. G.
  - Electric Service Sup. Co.
  - International Reg. Co., The
  - Ohmer Fare Register Co.
  - Rooke Automatic Reg. Co.
- **Reinforcement, Concrete**
  - Amer. Steel & Wire Co.
  - Carnegie Steel Co.
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  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
- **Repair Work (See also Coils)**
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - Westinghouse Elec. & M. Co.
- **Replacers, Car**
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
- **Resistance, Grid**
  - Columbia M. W. & M. I. Co.
- **Resistance, Wire and Tube**
  - General Electric Co.
  - Westinghouse Elec. & M. Co.
- **Resistances**
  - Consolidated Car Heating Co.
- **Retrievers, Trolley (See Catchers and Retrievers, Trolley)**
- **Rheostats**
  - General Electric Co.
  - Westinghouse Elec. & M. Co.
- **Roofing, Car**
  - Pantasote Co., The
- **Sanders, Track**
  - Brill Co., The J. G.
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
  - Nichols-Lintern Co.
  - Ohio Brass Co.
- **Sash Fixtures, Car**
  - Brill Co., The J. G.
- **Sash, Metal, Car Window**
  - Hale-Kilburn Co.
- **Scrapers, Track (See Cleaners and Scrapers, Track)**
- **Screw Drivers, Rubber Insulated**
  - Electric Service Sup. Co.
- **Seating Materials**
  - Brill Co., The J. G.
  - Pantasote Co., The
- **Seats, Bus**
  - Hale-Kilburn Co.
  - Heywood-Wakefield Co.
  - St. Louis Car Co.
- **Seats, Car (See also Rattan)**
  - Brill Co., The J. G.
  - Hale & Kilburn Corp.
  - Heywood-Wakefield Corp.
  - St. Louis Car Co.
- **Second-Hand Equipment**
  - Electric Equipment Co.
  - Michaels, Hyman Co.
  - Snyder Corp., The S.
  - Transit Equipment Co.
  - Zelnicker Supply Co., W. A.
- **Shades, Vestibule**
  - Brill Co., The J. G.
- **Shovels**
  - Hubbard & Co.
- **Shovels, Power**
  - Allis-Chalmers Mfg. Co.
  - Brill Co., The J. G.
- **Signals, Car Starting**
  - Consolidated Car Heating Co.
  - Electric Service Sup. Co.
  - Nat'l Pneumatic Co., Inc.
- **Signals, Indicating**
  - Nichols-Lintern Co.
  - Oskel Equipment Co.
- **Signal Systems, Block**
  - Electric Service Sup. Co.
  - Nachod Signal Co., Inc.
  - Union Switch & Signal Co.
  - U. S. Electric Signal Co.
  - Wood Co., Chas. N.
- **Signal Systems, Highway Crossing**
  - Nachod Signal Co., Inc.
  - U. S. Electric Signal Co.
- **Slack Adjusters (See Brake Adjusters)**
- **Slag**
  - Carnegie Steel Co.
- **Sleet Wheels and Cutters**
  - Anderson M. Co., A. & J. M.
  - Columbia M. W. & M. I. Co.
  - Electric Ry. Equip. Co.
  - Electric Service Sup. Co.
  - Nuttall Co., R. D.
- **Smokestacks, Car**
  - Nichols-Lintern Co.
- **Snow-Plows, Sweepers and Brooms**
  - Brill Co., The J. G.
  - Columbia M. W. & M. I. Co.
  - Consolidated Car Fender Co.
- **Snow Sweeper, Rattan**
  - Heywood-Wakefield Co.
- **Soldering and Brazing (See Welding Processes and Apparatus)**
- **Spikes**
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- **Special Adhesive Papers**
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  - Lorain Steel Co., The
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  - Westinghouse Elec. & M. Co.
- **Splicing Sleeves (See Clamps and Connectors)**
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  - Brill Co., The J. G.
  - St. Louis Car Co.
  - Taylor Electric Truck Co.
- **Sprinklers, Track and Road**
  - Brill Co., The J. G.
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  - Morton Mfg. Co.
- **Steps, Car**
  - Morton Mfg. Co.
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  - Babcock & Wilcox Co.
  - Westinghouse Elec. & M. Co.
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  - Oskel Equipment Co.
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- **Strand**
  - Roebling's Sons Co., J. A.
- **Superheaters**
  - Babcock & Wilcox Co.
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  - Ramapo Ajax Corp.
- **Switches and Switchboards**
  - Allis-Chalmers Mfg. Co.
  - Anderson M. Co., A. & J. M.
  - Electric Service Sup. Co.
  - General Electric Co.
  - Westinghouse Elec. & M. Co.
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  - Nichols-Lintern Co.
- **Switches, Tee Rail**
  - Ramapo Ajax Corp.
- **Switches, Track (See Track, Special Work)**
- **Tampers, Tie**
  - Ingersoll-Rand Co.
  - Railway Track-work Co.
- **Tapes and Cloths (See Insulating Cloth, Paper and Tape)**
- **Tee Rail, Special Track Work**
  - Rampo Ajax Corp.
- **Telephones and Parts**
  - Electric Service Sup. Co.
- **Terminals, Cable**
  - Stanadrd Underground Cable Co.
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  - Consolidated Car Heating Co.
  - Gold Car Heating & Lighting Co.
  - Railway Utility Co.
  - Smith Heater Co., Peter
- **Ticket Choppers and Destroyers**
  - Electric Service Sup. Co.
- **Ties, All Metal**
  - Metal Safety R'way Tie Co.
- **Ties and Tie Rods, Steel**
  - American Bridge Co.
  - Barbour-Stockwell Co.
  - Carnegie Steel Co.
  - International Steel Tie Co.
- **Ties, Wood Cross (See Poles, Ties, Posts, etc.)**
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  - Wharton, Jr., & Co., Inc., Wm.
- **Tool Steel**
  - Carnegie Steel Co.
- **Tools, Track and Misc.**
  - Amer. Steel & Wire Co.
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
  - Hubbard & Co.
  - Railway Track-work Co.
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  - Archbold-Brady Co.
  - Westinghouse Elec. & M. Co.
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  - Railway Track-Work Co.
- **Trackless Trolleycars**
  - St. Louis Car Co.
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  - Barbour-Stockwell Co.
  - Columbia M. W. & M. I. Co.
  - Indianapolis Switch & Frog Co.
  - New York Switch & Crossing Co.
  - Ramapo Ajax Corp.
  - Wharton, Jr., & Co., Inc., Wm.
- **Transfer Issuing Machines**
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- **Transfer Tables**
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- **Transformers**
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  - General Electric Co.
  - Westinghouse Elec. & M. Co.
- **Transmission Towers & Structures**
  - Amer. Bridge Co.
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  - Electric Service Sup. Co.
  - General Electric Co.
  - Nat'l Ry. Appliance Co.
  - Nuttall Co., R. D.
  - Ohio Brass Co.
- **Trolley Bases, Retrieving**
  - Anderson M. Co., A. & J. M.
  - Electric Service Sup. Co.
  - General Electric Co.
  - Nat'l Ry. Appliance Co.
  - Nuttall Co., R. D.
  - Ohio Brass Co.
- **Trolley Buses**
  - Brill Co., The J. G.
  - General Electric Co.
  - Westinghouse Elec. & M. Co.
- **Trolley Materials**
  - Electric Service Sup. Co.
  - Ohio Brass Co.
- **Trolley Shoes**
  - Economy Elec. Devices Co.
- **Trolleys and Trolley Systems**
  - Ford Chain-Block Co.
- **Trolley Wheels (See Wheels, Trolley)**
- **Trolley Wheels & Harps**
  - Thornton Trolley Wheel Co.
- **Trolley Wire**
  - American Elec'l Works
  - Amer. Steel & Wire Co.
  - Anaconda Copper Mining Co
  - Roeblings Sons Co., J. A.
  - Rome Wire Co.
- **Trucks, Car**
  - Baldwin Locomotive Wks.
  - Brill Co., The J. G.
  - Bemis Car Truck Co.
  - St. Louis Car Co.
  - Taylor Electric Truck Co.
  - Westinghouse Elec. & M. Co.
- **Tubing, Steel**
  - National Tube Co.
- **Tubing, Yellow & Black Flexible Varnishes**
  - Irvington Varnish & Ins. Co.
- **Turbines, Steam**
  - Allis-Chalmers Mfg. Co.
  - General Electric Co.
  - Westinghouse Elec. & M. Co.
- **Turbines, Water**
  - Allis-Chalmers Mfg. Co.
- **Turnstiles**
  - Electric Service Supplies Co.
  - Percy Mfg. Co., Inc.
- **Turntables**
  - Amer. Bridge Co.
  - Indianapolis Switch & Frog Co.
- **Vacuum Impregnation**
  - Allis-Chalmers Mfg. Co.
- **Valves**
  - Ohio Brass Co.
  - Westinghouse Tr. Br. Co.
- **Varnished Papers**
  - Irvington Varnish & Ins. Co.
- **Varnish Silks**
  - Irvington Varnish & Ins. Co.
- **Varnishes (See Paints, etc.)**
- **Ventilators, Car**
  - Brill Co., The J. G.
  - National Ry. Appliance Co.
  - Nichols-Lintern Co.
  - Railway Utility Co.
  - St. Louis Car Co.
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  - Indianapolis Switch & Frog Co.
  - Ohio Brass Co.
  - Railway Track-work Co.
- **Welders, Portable Electric**
  - Electric Ry. Imp. Co.
  - Indianapolis Switch & Frog Co.
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  - Railway Track-work Co.
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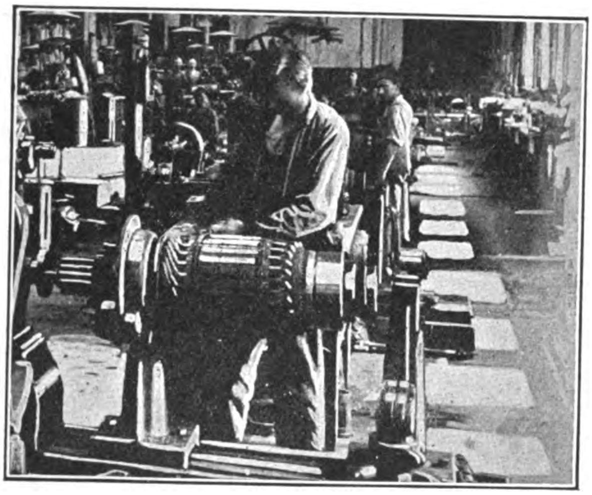

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100% More Alkali and Acid Resistance
200% Better Aging Qualities
200% More Resistance to Oil
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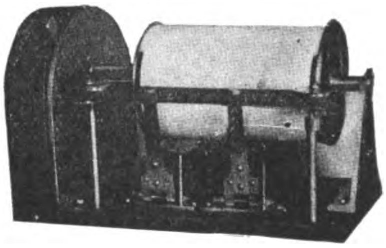

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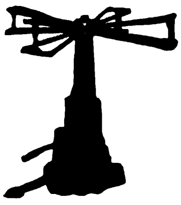

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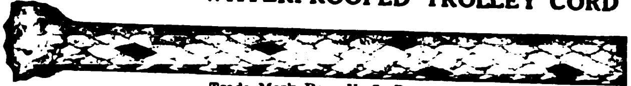

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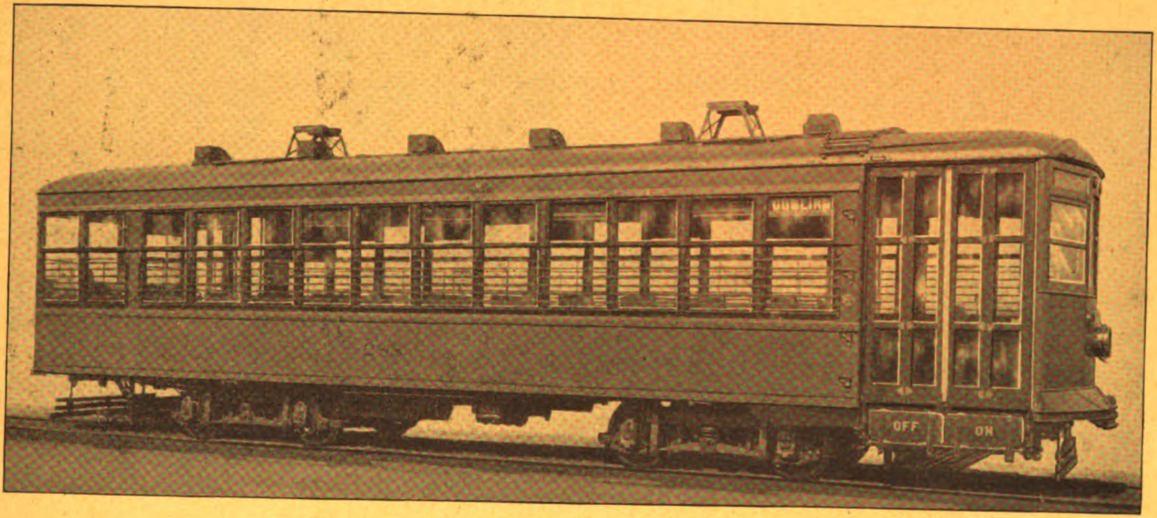

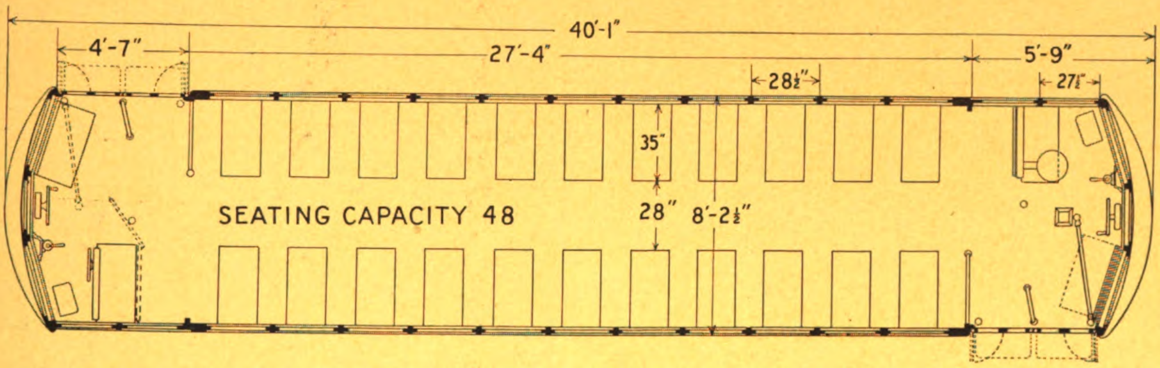

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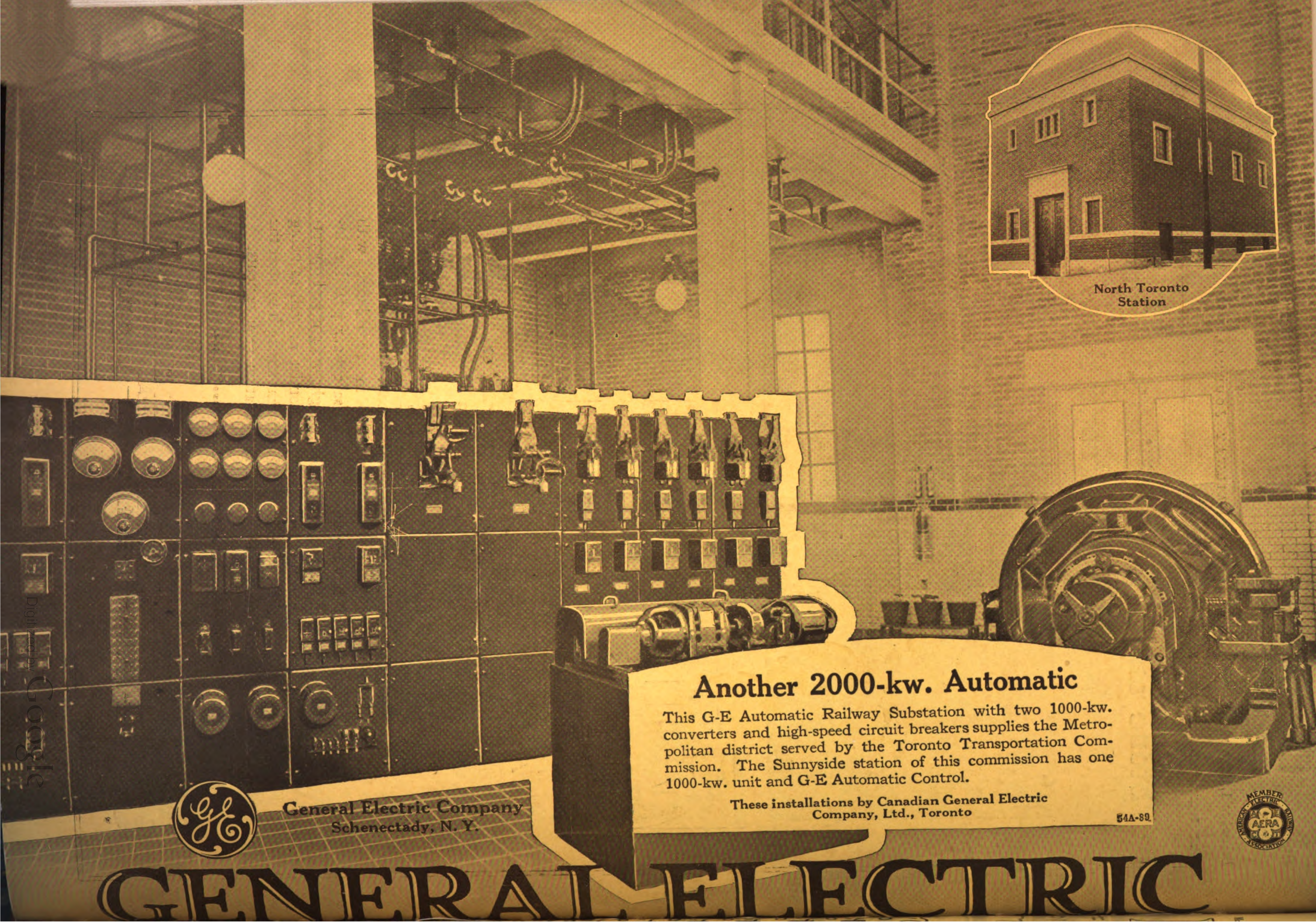

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These installations by Canadian General Electric Company, Ltd., Toronto

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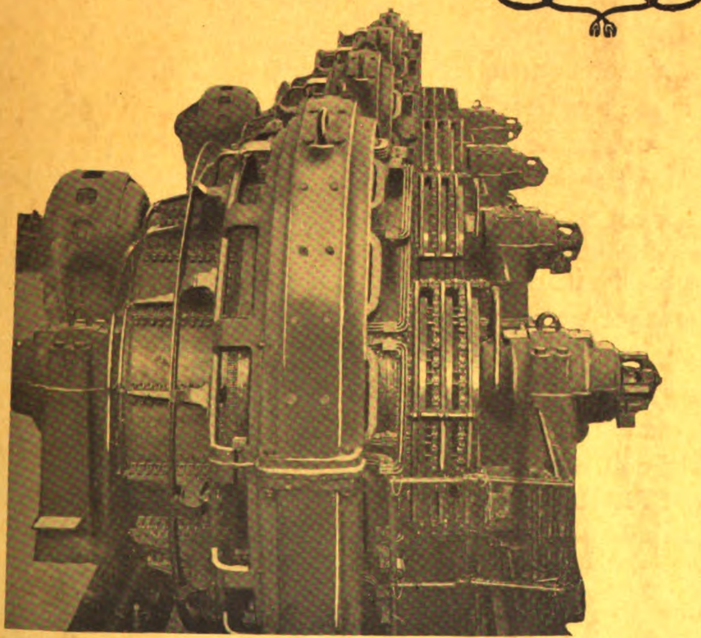

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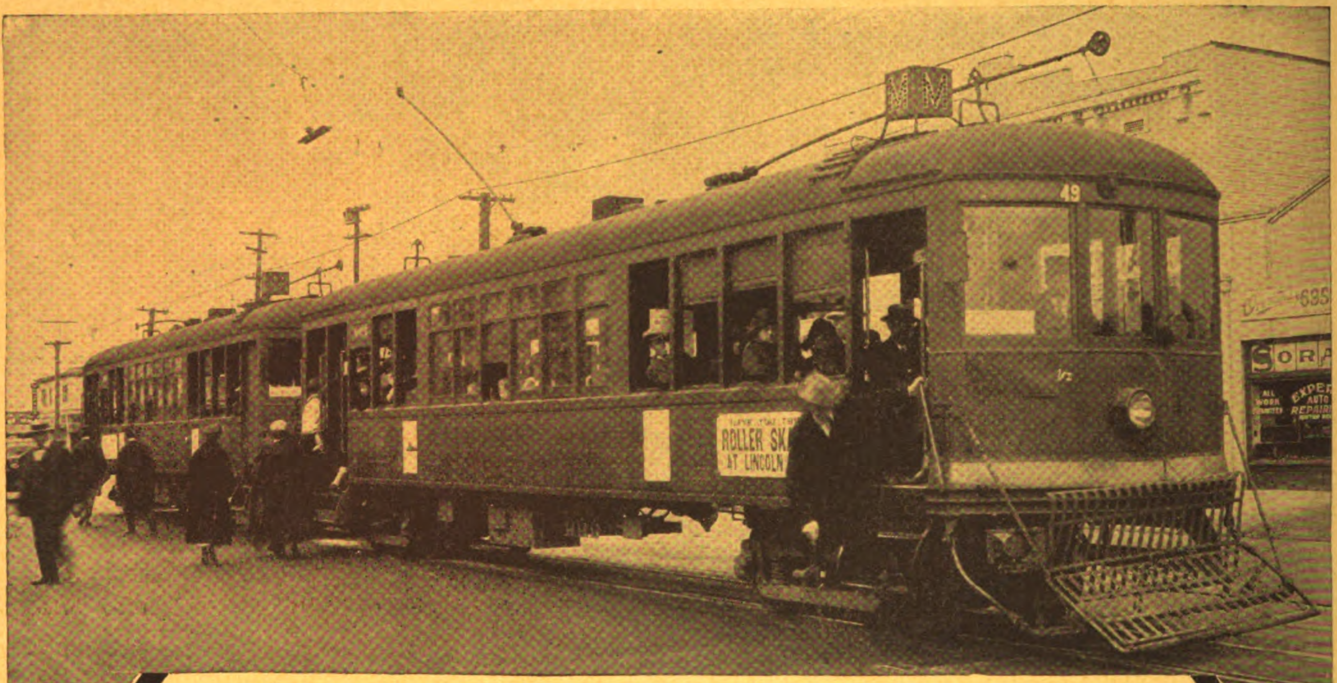

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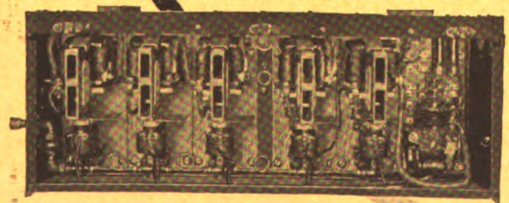

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The Value of the Statistical Number

The following is an excerpt from the record in a recent court proceeding:

Q. Have you some figures taken from the Electric Railway Journal?

A. I have.

Q. What is the Electric Railway Journal?

A. It is a publication generally recognized as an authority on street railway operation.

Q. Have you the figures shown by the Electric Railway Journal of the cars ordered by city railways within the United States during the eleven years past?

A. I have.

Q. How many cars have been ordered during the past eleven years in the United States?

A. 28,417.

Q. Of that number, how many were open cars?

A. 342.

Q. Have there been any open cars ordered within the United States, according to the articles of the Electric Railway Journal, since 1916?

A. No.

Q. In 1916 how many cars were ordered?

A. 3,046.

Q. How many of these were open cars?

A. 131 were open cars, or 4.31 per cent.

Q. As you state, no open cars have been ordered since 1916. Is that correct?

A. That is correct.

Q. What was the total number of cars ordered in 1917?

A. 1,998.

Q. In 1918?

A. 1,842.

Q. In 1919?

A. 2,129.

Q. And the following year?

A. 2,889.

Q. And in 1921?

A. 1,059. I might add that these figures cover cars for city service only.

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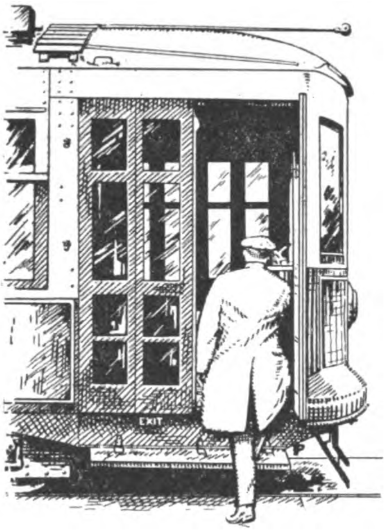

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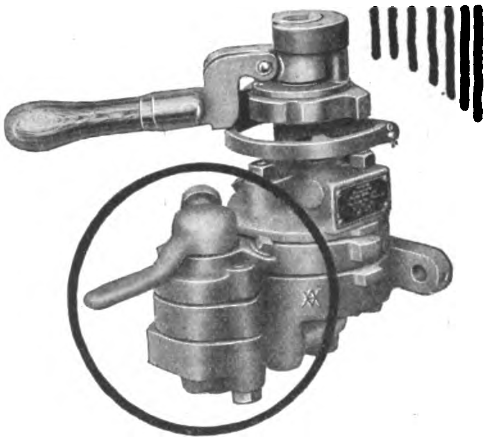

The New SELECTOR VALVE as Incorporated in the Pipe Bracket of the Standard M-28 Safety Car Brake Valve.

Solve the Door Control Problem

The use of double passageways on Safety Cars to facilitate passenger interchange is extremely desirable, but should be accompanied by independent door control. The Door Selector Valve, functioning in connection with the Standard M-28 Safety Car Brake Valve, provides this important feature, making it a simple matter to open or close either door independently, or both together, as occasion demands.

With the Selector Valve the operator is always able to regulate the flow of both streams of passengers in such manner as he finds best suited to the conditions of one-man operation.

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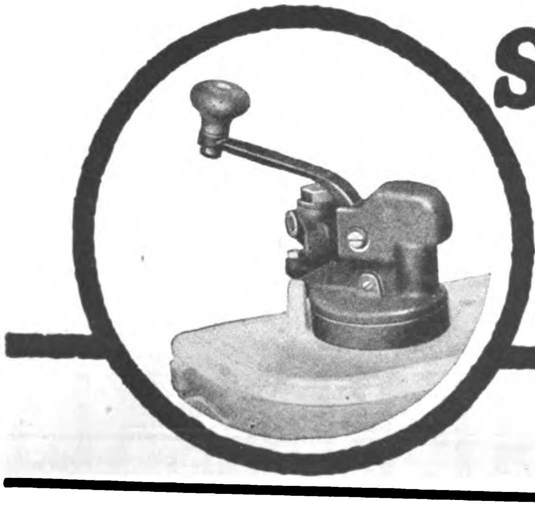

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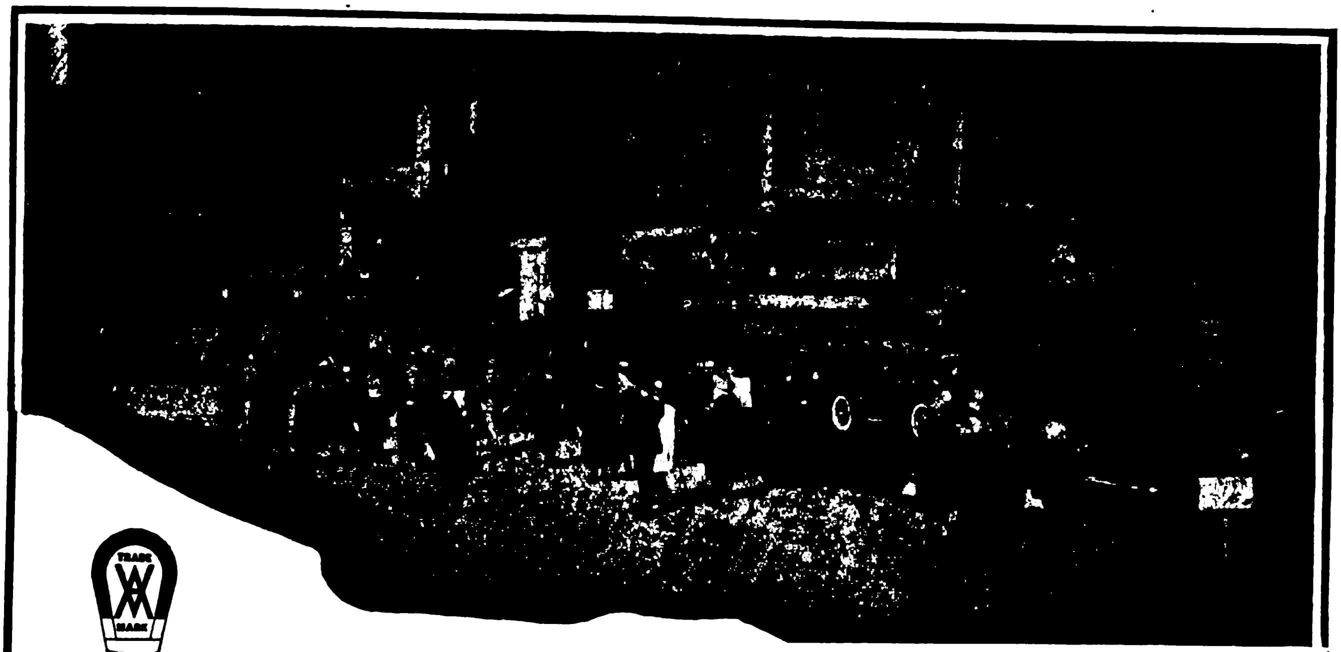
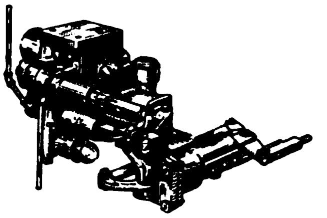


There Is Keen Competition for the Use of City Streets



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The Westinghouse Variable Load Brake has been developed to solve the problem of controlling cars under widely varying load conditions. It is an attachment which may be added to any straight air or semi-automatic equipment whereby the braking force is automatically adjusted to suit the weight on the car, by regulating the brake cylinder pressure as the weight changes.

The adjusting mechanism is thrown into engagement by the opening of the car doors. While the doors are open, passengers are leaving and entering the car, and when the doors are closed again, the condition of loading will be that under which brake operation will take place for the next stop, or a slowdown, as occasion may demand.

The use of the Brake insures stopping within a uniform distance regardless of whether the car is empty or loaded.

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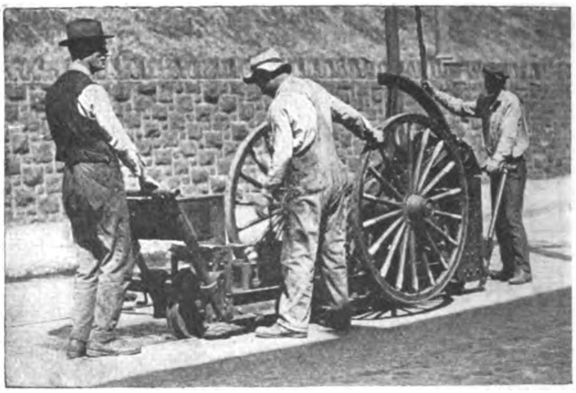
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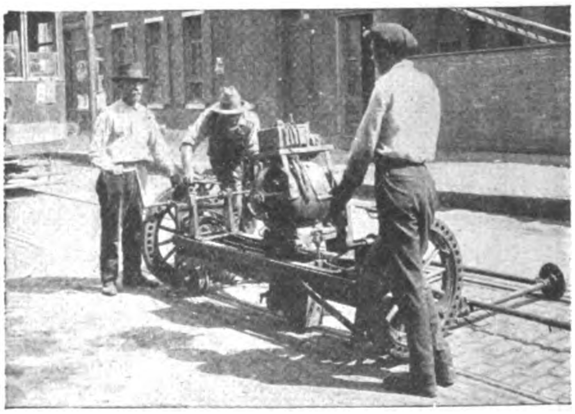
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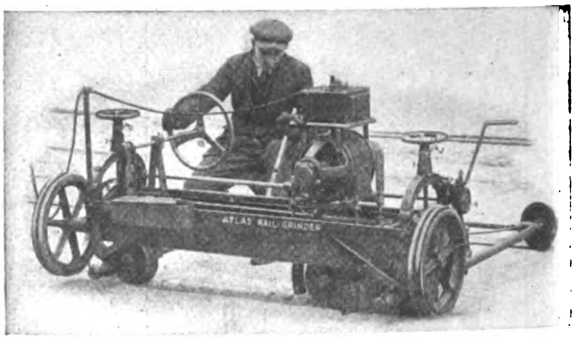

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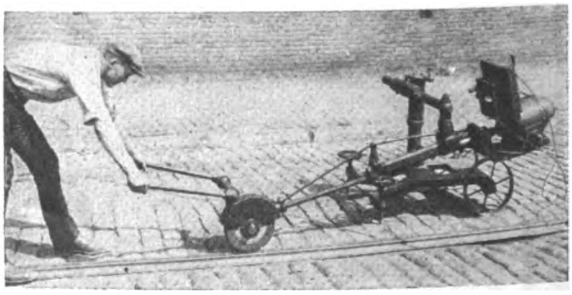
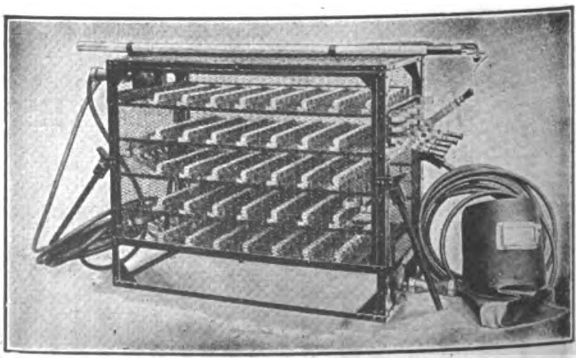
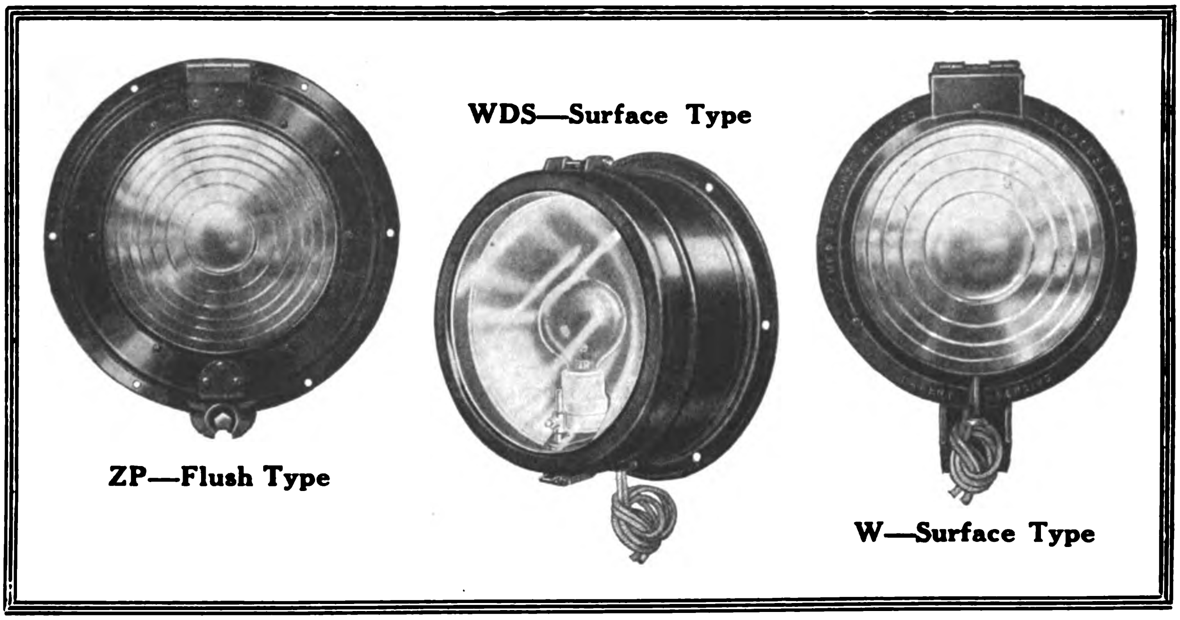

"Hercules" Rail Grinder


"Ajax" Electric Arc Welder

Imperial Headlights—



Three Popular City Car Types

ZP

Made in flush mounting, pressed steel cases. Furnished with clear glass, "Noglare" glass or red, green, blue or "Noglare" semaphore lens. Reflectors, polished aluminum, nickel-plated copper or white enameled-steel. With five-sided door lock or spring-plunger catch.

WDS

Made in flush, surface, roof and portable mountings, sheet steel or cast iron cases. Clear or "Noglare" glass in plain or grid door. Crystal or Gold Ray accurately ground glass reflectors or Sterling Ray nickel-plated copper reflector.

W

Made in surface mounting types in cast iron cases. Clear, or "Noglare" glass or red, green, blue or "Noglare" semaphore lens, in plain or grid door. The Type W is supplied with metal reflectors like the Type ZP.

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The Ohio Brass Co.
Mansfield, Ohio, U.S.A.

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Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators

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WITH no greater cost than that of the Christmas basket or the traditional turkey, you can give employees a lasting gift—Life Insurance. It will mean much more to your men—and to you, in increased team-work—than any passing remembrance. 73.8% of the 2,000 employees of the Public Service Company of Northern Illinois chose it above all other company gifts. It's a *unique* gift—one that cannot be duplicated. And its effects will not be gone in a week—or a year. Many concerns rate group insurance as more than a gift—as a profit-paying investment. Why not turn this Christmas into one of double good-will and profit both to you and your employees?

A plan all ready for you

Christmas is nearly here. But, The Travelers, which has planned Christmas Group Insurance for hundreds of industrial and business leaders, has a plan all worked out to fit every business. It includes high grade Christmas cards to mail to your employees announcing the insurance plan, or cards to insert in the Christmas Pay Envelope. The details are ready for you No obligation—write or wire at once.

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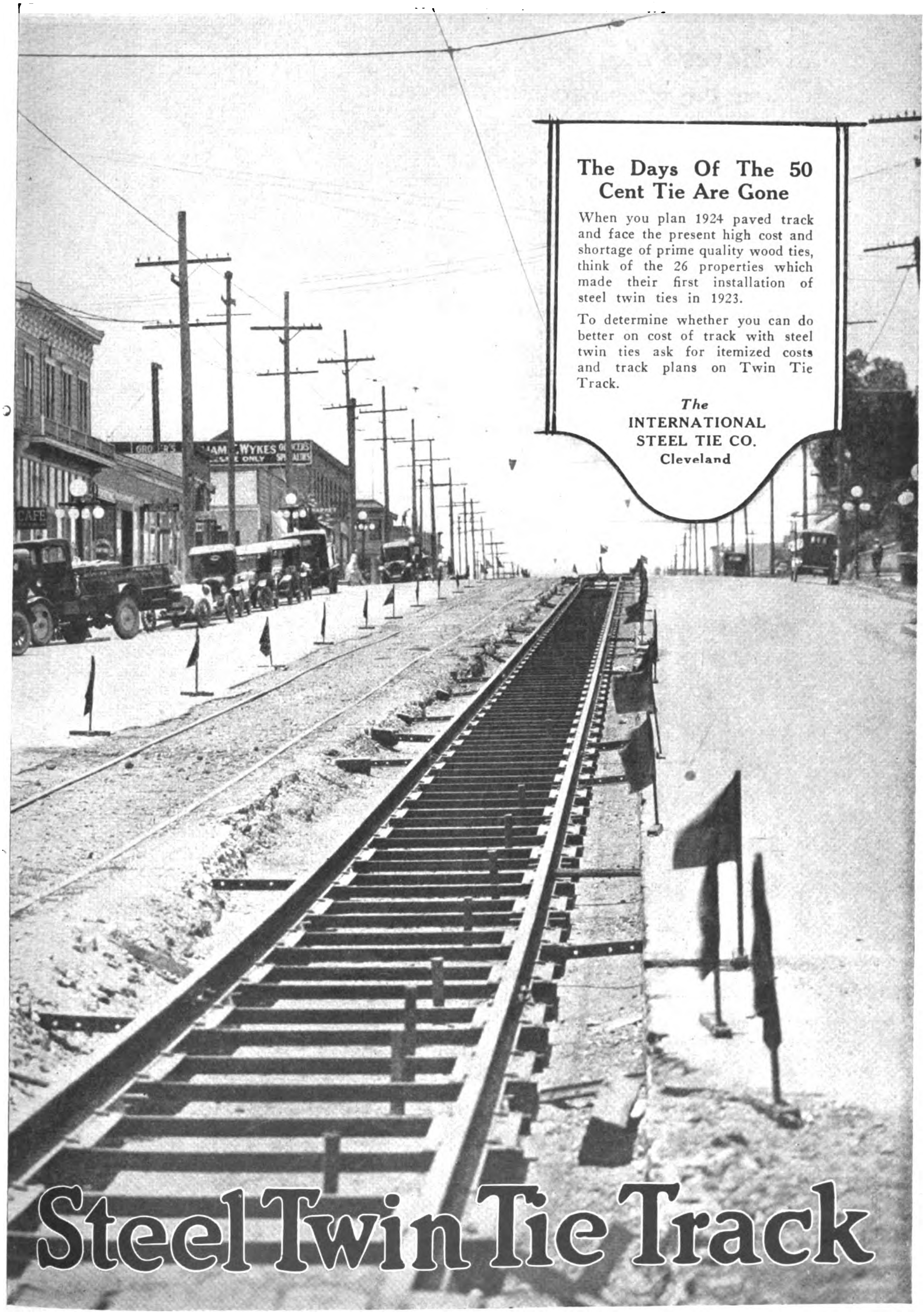


The Days Of The 50 Cent Tie Are Gone

When you plan 1924 paved track and face the present high cost and shortage of prime quality wood ties, think of the 26 properties which made their first installation of steel twin ties in 1923.

To determine whether you can do better on cost of track with steel twin ties ask for itemized costs and track plans on Twin Tie Track.

The
INTERNATIONAL
STEEL TIE CO.
Cleveland

Bates Poles

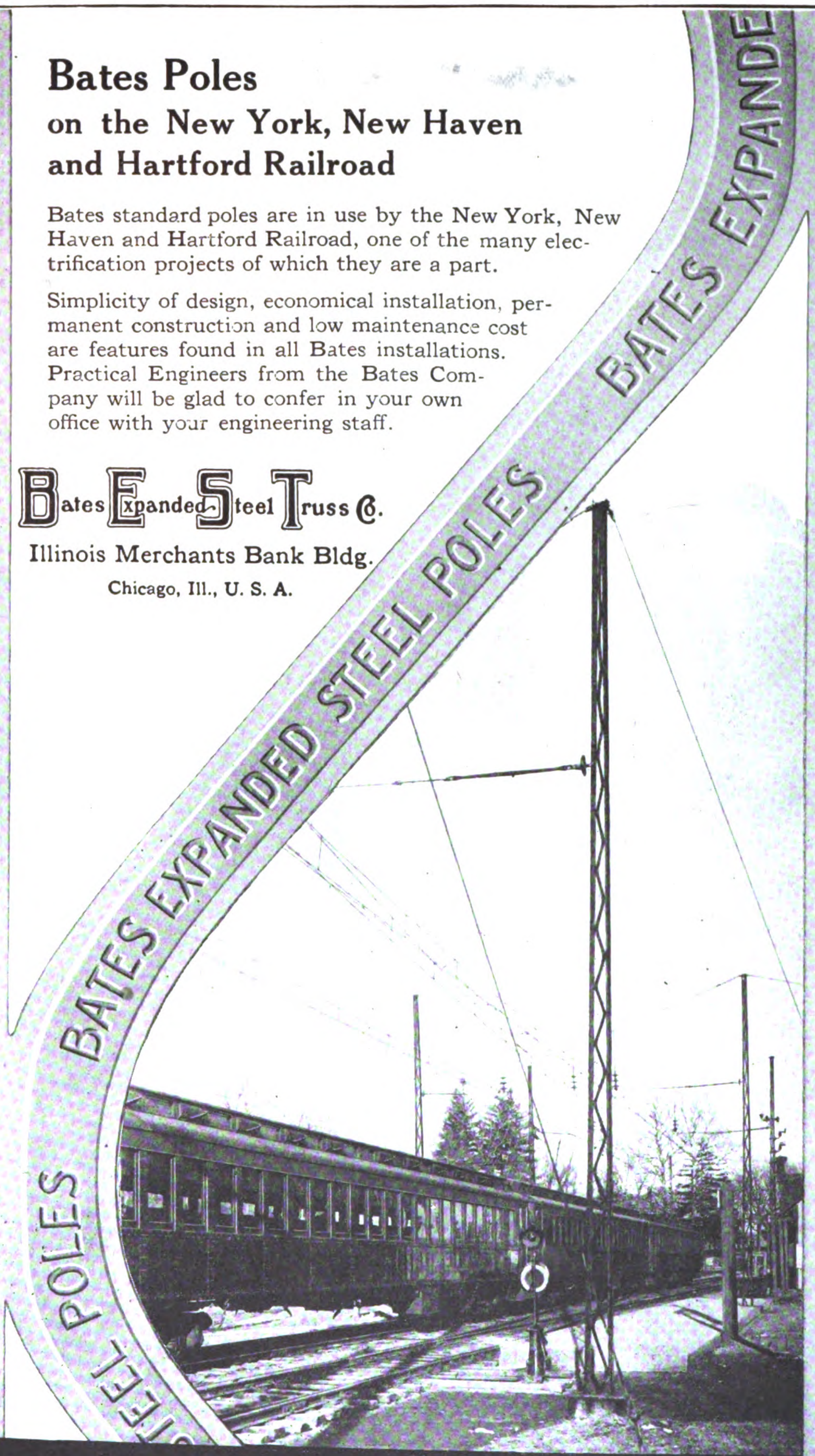
on the New York, New Haven and Hartford Railroad

Bates standard poles are in use by the New York, New Haven and Hartford Railroad, one of the many electrification projects of which they are a part.

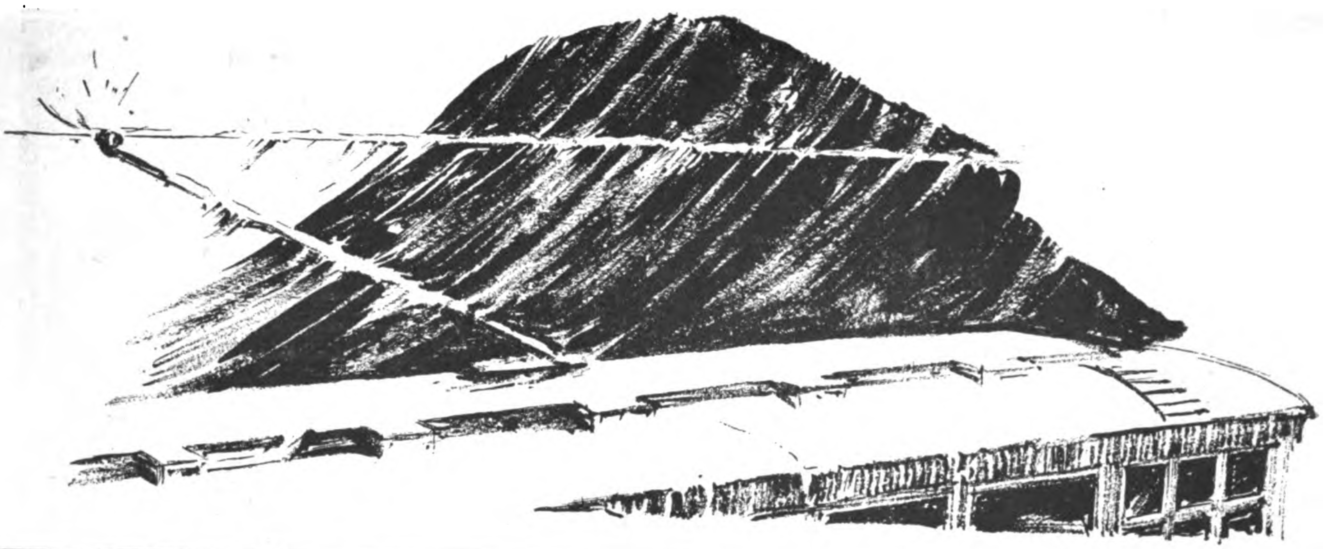
Simplicity of design, economical installation, permanent construction and low maintenance cost are features found in all Bates installations. Practical Engineers from the Bates Company will be glad to confer in your own office with your engineering staff.

Bates Expanded Steel Truss Co.

Illinois Merchants Bank Bldg.
Chicago, Ill., U. S. A.


BATES EXPANDE
BATES EXPANDED STEEL POLES
BATES EXPANDED STEEL POLES
POLES
STEEL

BATES ONE PIECE EXPANDED STEEL POLES



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Trolley and Line
Equipment:

- Cornwell Sleet Cutters
- Sleet Scrapers
- Trolley Harps
- Trolley Poles
- Trolley Wheels
- Trolley Wheel Bushings
- Trolley Rope Snaps
- Samson Trolley Cord
- Keystone Overhead Material
- Frogs, Crossings, Ears, Suspensions, etc.

Sleet days!

Ripping through clinging masses of sleet, sputtering, arcing, jumping—these Winter conditions impose an awful strain on trolley and line materials.

Take sleet cutters first, for instance. The ordinary kind will "burn up" in a couple of hours. Our "Cornwell Positive" type cutter is a different breed. Made of cast steel with a small removable brass lug for the electrical contact. This small lug is all that burns out, and it can be replaced quickly and at minimum expense. Cornwell Sleet Cutters are easily attached without changing wheel or harp.

Other Keystone trolley and line material is equally efficient. Consult the list at the left and stock up for winter wear.

ELECTRIC SERVICE SUPPLIES CO.

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Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver

International Ties are inspected with measuring rules by men familiar with the characteristics of timber in the Southwestern territory.

The Real Significance of International Tie Service

THE foundation of International Tie Service is built on the production of sound, durable ties of uniform size in strict accordance with A. R. E. A. grades.

"Always a Standard Specification Tie" is a slogan inseparably associated with the International Tie Organization.

The specifications are simple and not difficult to interpret—you CAN get standard specification ties if you INSIST on getting them. Rigid inspection has not been found to discourage production after the producers learn what is expected. But it is quite natural that they make small ties as long as you will take them.

If you purchase your 1924 ties through the International Tie Organization you are assured of Standard Specification Ties. They cost no more—they are merely worth more.

Contract for your requirements now.

International Creosoting & Construction Co.

General Office: Galveston, Texas

Plants: Texarkana, Texas Beaumont, Texas
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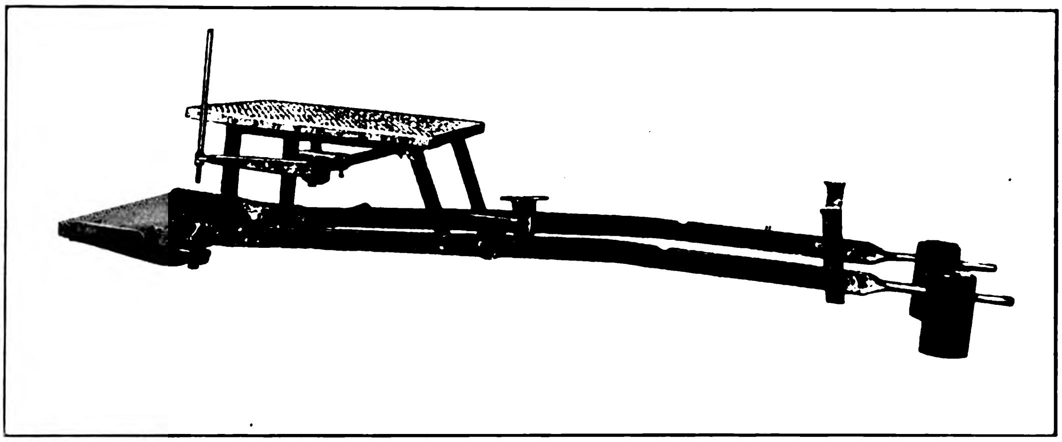
International

Treated Ties

ICC 23

Always a standard specification Tie



This is the treadle mechanism of

THE AUTOMATIC DOOR CAR

Facilitates Passenger Interchange—

Without attention from the operator, this new and remarkable device opens the exit door to permit passengers to alight and closes automatically after the last one gets off. This treadle, built into the platform floor, actuates the door engine valves. Passengers cannot enter through this automatic exit door. Interlocked with brake valve so door cannot open while car is in motion.

This is an important time-saving auxiliary where larger cars are to be operated by one man. Over a year's service on some of Chicago's double truck one man cars has proved it.

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Incorporated
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Manufactured in Canada by
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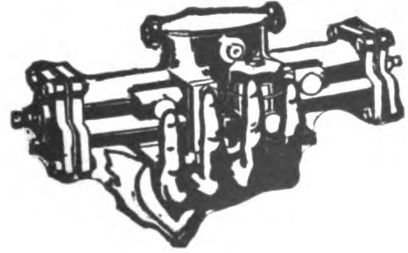
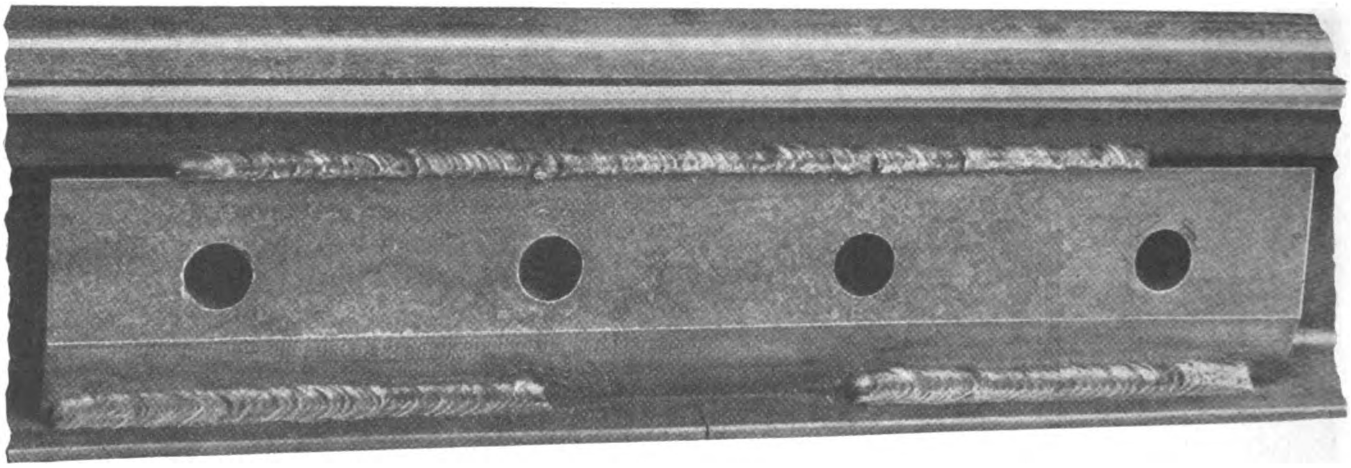




Many Important Features

UNA Joints
(Patented)

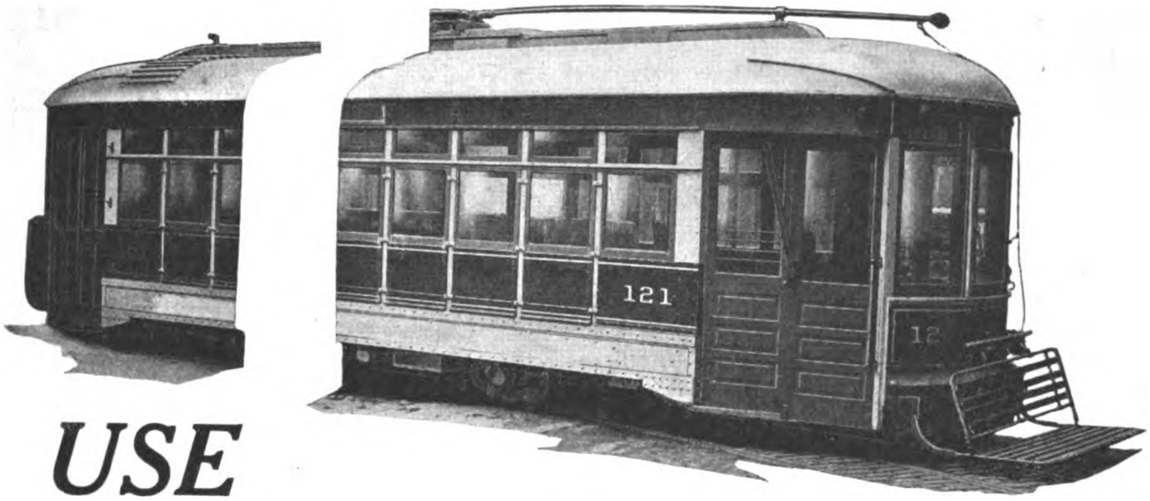
UNA Joints resulted from a development based on a thorough understanding of the requirements necessary in the making of economical and durable seam-welded joints. Years of scientific research coupled with practical engineering are back of UNA Joints. Just consider the following characteristics which have appealed so strongly to many engineers.

1. Elimination of the gap between rail heads
2. Rail heads under compression
3. Proper mechanical structure to obtain strength
4. Correct methods of assembling joints
5. Heavy seam welds by improved welding process
6. Comparatively low welding current
7. Excellent seam metal with UNA Joint Rod
8. Staggered seam welds to distribute stresses
9. Skipping gap to relieve stresses
10. Proper grinding of joints after welding

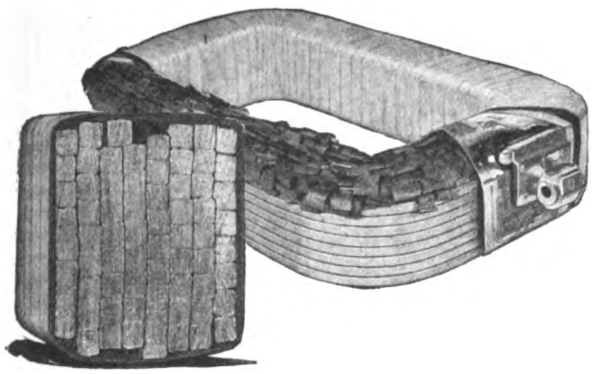
We will be glad to submit full information about UNA Joints and detailed recommendations for their installation on your track.

Rail Welding & Bonding Company, Cleveland, Ohio
Manufacturers of
UNA Bonds

CUT OFF DEAD WEIGHT



USE
ALUMINUM FIELD COILS



and save from 400 to 1500 pounds on every car

The characteristic relations between the cross sectional areas and corresponding resistances of aluminum and copper, and the per cent saving in weight are such that for the Aluminum Coil resistance to equal the copper resistance, the cross sectional area of the Aluminum conductor must be increased 59%—and when increased by that amount the SAVING IN WEIGHT IS 52%. The foregoing is based on the Aluminum Coils having the correct number of turns.

Aluminum field coils have been in operation in Europe for fifteen years and more than 60 American Railways are now using them.

Let us quote you prices and answer detailed questions.

Advantages of Aluminum Field Coils—

Permanent insulation.
Moisture and heat resisting.
Uniform distribution of heat.
Quick conduction of heat.
50% to 60% weight reduction.
Brass spools not needed on large coils.
Less chafing due to lighter weight.
Less terminal trouble.
Longer life—less renewals.

Economy Electric Devices Company

L. E. Gould, Pres., Old Colony Bldg., Chicago

National Railway Appliance Co., New York
L. A. Nott, San Francisco
Burton R. Stare Co., Seattle
Cable Address: Sangamo, Chicago

GENERAL SALES AGENTS:
Sangamo Economy Meters
Lind Aluminum Field Coils
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The Air Rectifier
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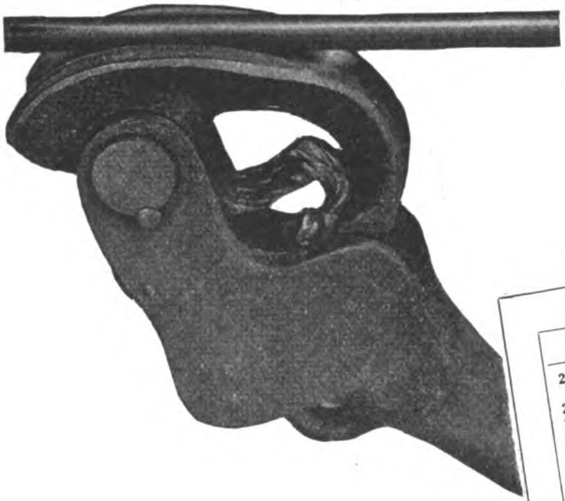
Bemis Boyerized Truck Specialties
Miller Trolley Shoes

Ludwig Hommel & Co., Pittsburgh
Grayson Railway Supply Co., St. Louis
Detroit Railway Supply Co.
Alfred Collyer & Co., Montreal, Quebec

These are the actual wire wear readings

over a 6-year period with MILLER TROLLEY SHOES



	WIRE TEST READINGS				
Pole No.	6/7/16	9/25/17	12/27/18	4/9/20	5/29/23
235		.477	.469		.445
		.474	.473		.451
267		.481	.474		.472
267-268		.482	.479		.474
336	.487	.481	.475		.459
338 Curve	.487	.479	.465		.420
438 Curve		.467	.453		.411
438 Curve		.467	.450		.402
440 Curve		.463	.451		.377
446		.472	.466		.390
482		.476	.472		.471
490	.477		.473		.465
491		.474	.472		.465
502		.475	.475		.465
505 Curve		.473	.469		.463
531		.476	.477		.468
558		.474	.474		.467
631	.479	.475			.464
634	.479	.477			.468
650		.476	.475		.470
659		.478			.469
662		.480			.471
726		.464	.464		.465
770		.477	.472		.468
788		.476	.473		.467
818		.477			.470
858		.476	.474		.467
901		.475	.474		.465
968 Curve		.476	.469		.455
984 Curve		.477	.471		.455
997 Curve		.477	.474		.470
1013		.483	.480		.472
1042		.479	.477		.472
1051 Curve		.479	.476		.471
1059		.483	.482		.477
1084 Curve		.478	.475		.469
1123		.483	.482		.479
1123		.482	.482		.472
1164 Curve		.479	.479		.478
1183 Curve		.482	.475		.469
1184		.483	.478		.470
1190		.482	.477		.472
1204		.469	.450		.334
1208		.478	.478		.471
1211		.479	.477		.471
1309		.478		.477	.471
1310		.480		.474	.468
1316		.481		.475	.469

—and what some other roads say!

Ephrata, Lebanon Traction Co.—

"Our experience has been that trolley shoes do not wear the wire as fast as wheels."

Chicago, No. Shore & Milw. R.R.—

". . . . condition found on inspection shows conclusively that there is less wear on the trolley wire due to the use of sliding contact than there is due to wheels."

Interstate Public Service Co.—

"They do not wear the trolley wire faster."

On the Portland Lewiston Interurban

Less than .003 of an inch wear per annum is the average of the above figures with 16,000 car passes per year. This hard-drawn 4/0 copper wire will last about 2,000,000 car passes at this rate. Will your trolley wire show any longer life with trolley wheels?

The Miller Trolley Shoe sliding contact gives to the wire a smooth glass-like surface, which resists wear and eliminates arcing. Moreover, less trolley pressure is required to hold the contactor on the wire.

Have you tested this out?

Miller Trolley Shoe Company
295 Columbia Road, Boston-21, Mass.
Western Representative:
Economy Electric Devices Co., 1590 Old Colony Bldg., Chicago, Ill.

MILLER TROLLEY SHOES

Electric Railway Lubrication

Galena Air Compressor Oil

The intense, dry heat of compression associated with the lubrication of air compressor cylinders makes it an entirely different proposition from the conditions identified with steam cylinder lubrication. The use of unsuitable oils will result in tarry and carbon deposits forming on cylinder valves and passages, interfering with the efficient operation of the compressor.

Of the many grades of oil marketed for this service, many are unsuitable for the simple reason that they lack the elements necessary to withstand high temperatures, and instead of atomizing readily, bake and carbonize. Aside from the danger to the machine itself, the "body" of the oil is reduced and there is a large loss through evaporation—passing off in vapor.

Like all lubricants bearing the "Galena" brand, Galena Air Compressor Oil is of highest quality. The crude from which it is produced was selected for its superior qualifications for the purpose, and is not contaminated by being run with other grades. This pure mineral oil is refined and treated in accordance with specifications that insure a finished product exactly suited to compressor lubrication, furnishing adequate protection to the cylinder walls. A durable body that holds compression, and a lower evaporation—features that contribute greatly to economical service.

Galena-Signal Oil Company

New York Franklin, Pa. Chicago

and offices in principal cities

RAILWAY SUPPLIES
GENERAL ELECTRIC COMPANY
SCHENECTADY, N.Y.
GECO

There's a wealth of line-material information in your G-E Railway Supply Catalog.

"GE" on line material means "Good Everywhere"

Improvements in and additions to G-E Line Material are made when necessary to meet changing conditions and to perfect the materials and designs employed.

The insulating material used is beyond the possibility of injury from any service temperatures. The mixture employed in castings was developed specially for this exacting service. The rust-resisting finish in most cases is given by electric-oven sherardizing, depositing both into and onto the surface a coating of zinc which cannot crack or scale with mechanical distortion or from sudden temperature changes.

In short, G-E Line Material will more than meet your service demands. And there are devices for every haulage requirement.

General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities

GENERAL ELECTRIC

40-231

New York, Saturday, December 8, 1923

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 62
Number 23

The Editorial of the Day

"A PLAN (for the reduction of taxes) has been presented in detail in a statement by the Secretary of the Treasury which has my unqualified approval. . . . Diminishing charges against moderate incomes from investment will afford immense relief, while a revision of the surtaxes will not only provide additional money for capital investment, thus stimulating industry and employing more labor, but will not greatly reduce the revenue from that source, and may in the future actually increase it.

"Being opposed to war taxes in time of peace, I am not in favor of excess-profits taxes. A very great service could be rendered through immediate enactment of legislation relieving the people of some of the burden of taxation. . . .

"The taxes of the nation must be reduced as much as prudence will permit, and expenditures must be reduced accordingly. High taxes reach everywhere and burden everybody. They bear most heavily upon the poor. They diminish industry and commerce. They make agriculture unprofitable. They are a charge on every necessary of life. Of all services which Congress can render to the country, I have no hesitation in declaring this one to be paramount. To neglect it, to postpone it, to obstruct it by unsound proposals, is to become unworthy of public confidence and untrue to public trust. The country wants this measure to have the right of way over all others.

"Another reform which is urgent in our fiscal system is the abolition of the right to issue tax-exempt securities. The existing system not only permits a large amount of the wealth of the nation to escape its just burden but acts as a continual stimulant to municipal extravagance. This should be prohibited by constitutional amendment. All the wealth of the nation ought to contribute its fair share to the expenses of the nation."—THE PRESIDENT.

Shall we not actively support this program?

Valuation Differences in Terms of Fares or Economies

IT FREQUENTLY occurs that municipal authorities and railway officials are unable to agree on a valuation of the property for rate-making purposes, and all progress of a managerial nature is blocked pending settlement. The question is raised whether this failure to come to a settlement figure is not often quite unjustified in the light of what the difference would mean in terms of increased rate of fare, from the standpoint of the city, or as measured in terms of economies or better earnings that may be held in abeyance, from the standpoint of the company.

For example, in one city recently the company held out persistently for a value about $1,500,000 higher than the city would concede, the city's figure being about $6,500,000 total. Yet with this mooted valuation settled, the company would be in a position to make operating improvements, as recommended by an outside expert, resulting in more than $500,000 increase in the net, annually. This increase alone would carry at 7 per cent a capitalization of $7,000,000—as much as the entire value of the property. Under such circumstances, a million or so difference between the value asked and the value obtainable would hardly seem worthy of being permitted to delay the possible improvements.

Similarly, the importance of the controversial difference dwindles in many cases when translated into the rate of fare required to support the higher figure of value. A difference which in itself seems like a huge sum may make a fraction of a cent too small for cognizance in the rate of fare especially on a large system—an amount which might easily be wiped out (or doubled) in a year of good (or bad) operation.

This paper is strongly of the opinion that if about 25 per cent of what is spent on valuation studies and litigation were spent instead in operating studies, the industry would make much more rapid progress. What is needed is more talent directed to transportation efficiency, and greater use of the yardstick method and common sense valuation procedure.

Are Improved Transportation Conditions Approaching in New York?

IF THE early future is to see a greater spirit of co-operation toward the New York City traction properties by the present city administration it will be welcome news for every one, particularly the traveling public. That such a condition is among the possibilities is indicated by recent remarks of acting Mayor Hulbert to the effect that the City Board of Estimate is now "working with the Transit Commission in harmonious co-operation for some real results in the way of a solution of the traffic problem." After all, results are what count in the long run in political as well as in business circles. Ability to scold may bring popularity for a time, but even picturesque invective gets monotonous. Unless a politician can get the people what they want his power is sure to wane.

Just at present the people of New York need more and better transportation more than almost anything else, and the only way it can be had to any material degree is through the existing transportation companies. It is wonderful what they have been able to do in the circumstances, but it is obvious that with fewer obstructions and better credit they could accomplish much more. Not all of the difficulties have come, of course, from the city government, but with that sympathetic and anxious to help, a better condition is certainly possible. New subways are needed, but while these are in the building it is practicable to increase the present transportation facilities, both rapid transit and surface. With the Brooklyn system reorganized and the reorganization of the New York Railways nearing completion, all of the companies are in a position to do their share in supplying the public need.

Of course the question of return is fundamental. Without an adequate fare all the companies will be greatly handicapped. Nevertheless it should be remembered that while the carfare in New York nominally is 5 cents, virtually it is more than this on both surface and rapid transit lines. On the rapid transit lines passengers get benefit from the fact that no interest is being paid on the city investment under the dual contract, while on the surface lines the average length of ride for a single fare has been reduced by the dissolution of holding companies and the consequent charge of an extra fare, and also by the 2-cent transfer charge. It should also be remembered that the surface lines do not have to carry the long distance riders, as in most other cities, as these go to the rapid transit lines. Perhaps the greatest handicap of the surface lines is slow speed, caused by street congestion, because their average receipts per car-mile compare favorably in amount with those of surface lines in other cities. Here is one way in which the city can help through the passage of more stringent anti-parking ordinances.

If the time has come when the New York City fathers are beginning to realize that a constructive transportation policy is good politics, the public has much to be thankful for.

A Billion Passengers on the Buses

REFERRING to an editorial in last week's issue of this paper, several readers have promptly called attention to the fact that to say buses in 1922 carried only 11,000,000 passengers was wrong—and it was. The figure quoted from the compilation of the Census Bureau was for passengers carried by buses operated by electric railways only—a qualification which was not noted. For all buses, it is probable, based on rough estimates, as no accurate figures are compiled, that the total passengers carried in 1923 will be up toward a billion —something less than 8 per cent of the number of revenue passengers carried on the electric railways of the country during the twelve months ended June 30, 1922.

While this is very different from the obviously erroneous figure used last week, nevertheless, by correcting figures all the way through, the editorial might still be permitted to stand. Its object was to point out the relatively very much greater importance of the electric railway to the public than the bus. The correct figures still show this, though they give to the bus industry a far better position of importance.

It was not the desire of this paper to belittle the bus, for readers know how the JOURNAL has urged its use in its place by the electric railways. But it was thought worth while to show the relative positions of bus and railway. The bus, being new and introducing many new problems and much speculation as to the future of transportation, is really talked of and read of, rather naturally, out of proportion to its present importance as measured by the traffic handled.

Customer Ownership of Utility Securities—From the Customer's Standpoint

THE advantages of customer ownership of utility securities—from the utility standpoint—have been set forth at various utility conventions during the last few years. Naturally, they present the subject from the standpoint of the utility, particularly the improved public relations which it is hoped will be secured by the plan. The position is put forth that if a man—or woman—becomes a security holder in the local utility, the latter thereby obtains a friend, whose sympathy can be counted upon and whose self-interest will encourage him to defend the company against unreasonable demands and unjust attacks. Broadly speaking, this is the main argument put forward for the plan from the utility side. It is interesting to read in the last issue of *The Magazine of Wall Street* an article which brings out other phases of the subject, particularly from the customer's point of view. This perhaps is a phase not often considered.

The magazine article expresses approval of the plan, where the utility is fundamentally a sound one and the stock is worth the amount charged for it. In the first place, it gives opportunity to the local investor to put limited sums in high grade securities of a concern in his home town where he can watch his money, at least to some extent. In this way it will help to counteract the fake-security salesman, educate the community up to the exercise of judgment in the investment field and thus be of constructive benefit to the country as a whole. Referring to this advantage, the paper says: "If consumer financing had nothing whatever to commend it beyond the single capacity toward interesting the general public in high grade, rather than low grade securities, this feature alone would more than justify it and seal it with the stamp of universal approval."

The magazine points out, however, that customer financing doubles the company's responsibility to its customers. It is responsible to them not only for service, but becomes, in effect, a trustee of their invested funds. This emphasizes the need of keeping faith with the customer security holder, giving him a voice in the company councils and letting him know from time to time the exact financial condition of the company. The fact that by his dividends he can pay in whole or in part for his service does not discharge all of the debt which the company owes to the customer who purchases its stock. He could do that by investing the same amount of money in any responsible concern, paying equal dividends.

This trustee responsibility rests upon any company which actively exploits its securities, especially toward those who may be induced to become purchasers to an extent out of proportion to their means. Such holders are in a different position than business men who are accustomed to occasional losses, and the utility must guard very zealously its ability always to pay the promised dividends, lest there come a kind of public relations not sought.

When the principles recommended by D. L. Turner, page 963, for financing rapid transit are accepted, we may look for much needed new construction. His allotment of the cost would be fair and not burdensome to any one, in the light of the return on the individual investment, and it would enable such service to pay its own way on a fare comparable with street railway fares.

Proposed Plan for Financing Detroit Rapid Transit Lines

Engineer's Report Favors Assessment of Construction Costs Against Taxpayers and Benefited Property Owners—Equipment Cost Only, or One-third of the Total, to Be Financed by Bond Issue—Combination Tunnel and Subway Proposed—Piecemeal Construction of Rapid Transit Has Serious Drawbacks

A NOVEL plan for financing new rapid transit lines is the outstanding feature of the report to the Rapid Transit Commission of Detroit by Daniel L. Turner, consulting engineer, and John P. Hallihan, engineer in charge. The report, whose legal features have the approval of P. J. M. Hally, special counsel for the commission, has been transmitted to Mayor Frank E. Doremus for his consideration.

According to the commission's letter of transmittal, the report proposes a pay-as-you-go plan that spreads the cost by assessment over the benefited property and the city at large, leaving only the equipment, which is about 32 per cent of the total investment, to be provided by a bond issue. In this way a large amount of interest will be saved, and the use of bonds based upon the faith and credit of the city will be practically eliminated.

No detailed plan of routes has been presented in the report of the engineers, as they state the location of lines will depend to a considerable extent on the choice of system, which in turn will be determined by the amount of money the city is willing to make available. A combination of subway and tunnel, termed a "tunnelway" by the engineers, is recommended as the most desirable construction if the city is willing to pay the price. A short abstract of the report follows:

A NEW METHOD OF FINANCING ESSENTIAL ON ACCOUNT OF COST

The cost of the proposed rapid transit system for Detroit is such as to indicate at the outset that the city must find some new method of financing a rapid transit program, otherwise it will be impracticable to go forward with it. Under the circumstances, therefore, it is essential that a financial plan should be evolved before a physical plan is announced. A plan of routes can serve no useful purpose, if the money to carry it out cannot be available. In fact, making public such a plan would cause a premature speculation in real estate along the proposed routes with no justification for it whatever.

The routes of the initial rapid transit system for Detroit are dependent, to some extent, upon the type of structure. An underground system may be constructed along any street without injuring it. Elevated lines should be confined to the outlying sections of the city, but if such construction must be carried through the business center, the principal thoroughfares should be avoided and less important streets traversed.

Developing rapid transit piecemeal is very objectionable from the community standpoint. A comprehensive system of rapid transit lines is essential. There should be crosstown lines and up and down town lines articulated together by transfer stations so as to provide for a convenient circulation and distribution of the traffic throughout the city, thus furnishing a large part of the city with a measure of rapid transit service at the outset, and thereby maintaining the equilibrium of the population distribution.

The building of a single rapid transit line at first, and then another single line, and so on, until finally a rapid transit system is produced, completely upsets the population equilibrium. The first line built acts as a magnet to the population and to business. Congestion of all kinds is produced and the line itself quickly becomes saturated with traffic. This causes an immediate demand for relief along the first line before new lines in new territory can be constructed. Traffic conditions then become so unbalanced at the start that it is difficult ever to catch up.

The initial rapid transit system must be constructed of either subways, tunnels or elevated lines, or a combination of them. Because it must traverse built-up sections of the city, other types, such as surface and depressed lines, cannot be utilized on account of the lack of a suitable right-of-way.

Subways are most popular with the public, as they do not disfigure the streets nor interfere with light, air and access to abutting property, are not open to the weather, and are conveniently accessible to passengers. Because they are shallow underground lines they cannot be constructed without taking up the street surface and rearranging the subsurface structures. Their chief disadvantage is their high cost of construction when compared with elevated lines.

Ordinarily, land tunnels must be located deep enough underground to permit their construction without disturbing the street surface, and stations are not conveniently accessible. Deep level lines have been employed chiefly in London, where the clay underlying the city is most favorable to their construction.

Except for the inaccessibility of the stations, tunnels have all the advantages of subways. If tunnel lines can be constructed as cheaply as subways and have their stations brought to the surface, there can be no difference of opinion as to their desirability, as the tunnel can be constructed with a minimum of interference with streets and with business.

Subsoil conditions in Detroit are almost ideal for tunneling, and the so-called Detroit clay permits a very low cost of construction. A type of underground line can be built that would include the desirable features of both tunnel and subway. This is the construction termed by the engineers a "tunnelway."

Tunnelways will be constructed just below the surface only at the stations, and the streets will be excavated up to the streets at such points. Between stations they will be constructed in tunnels, one for each track. This means that interference with business during the construction period will be reduced to about 30 per cent of what it would be if a subway were built. The stations will be located at the summits of the profile, so that the trains will have the assistance of the grades in starting and stopping.

At present prices of labor and material it would not be possible to construct and operate a tunnelway system at anything like a 5-cent fare. In this connection it should be pointed out that in New York 61 per cent of the entire rapid-transit system is elevated, or some 125 miles out of 200. Even the so-called subway division of the Interborough Rapid Transit Company—a city-owned subway system—includes elevated lines to the extent of 40 per cent, and the total city-owned systems in New York have 39 per cent of all lines elevated.

In Chicago there are no subway lines. In Philadelphia the entire existing rapid-transit system consists of less than 14 miles of line, and about 85 per cent of this is elevated. In Boston the rapid-transit system, as now operated, is about 16 miles long, and 63 per cent of it is elevated.

To obtain a cheap fare, when the rider must pay the entire cost, a cheap system is necessary. To have a tunnelway system supported by the car rider a 10-cent fare, or more, would be necessary for a number of years.

TUNNELWAYS COST ABOUT ONE-THIRD MORE THAN ELEVATED

Until the financial plan has been decided upon and the extent of the system determined, only costs per mile of route can be given. Detroit must pay the cost of both the construction and the equipment of the system. Such costs at present prices are approximately, for an elevated system, $3,500,000 per mile, and for a tunnelway system, $4,700,000 per mile, including all overhead charges.

The tunnelway system consists exclusively of tunnelway lines. The elevated system is mostly elevated, but includes a minimum amount of tunnelway line through the business center. Detroit can have a tunnelway system, says the report, if it wants to pay the price. Otherwise it must accept an elevated system, with all the disadvantages that such a system means to a city.

RAPID TRANSIT SHOULD BE FINANCED UNDER AN ASSESSMENT PLAN

The rapid transit cost should be divided and distributed according to the three benefits derived:

The general benefit to the city at large;

The special benefit that accrues to the property in the vicinity of the lines; and

The obvious benefit to the rider.

Based upon an analysis of the financial condition of the city by the Detroit Bureau of Governmental Research, and from other information available, it is doubtful if the city can now issue bonds in excess of $30,000,000 for all purposes, states the report. Because of the city's many needs only a very small part of this amount can be used for rapid transit purposes. Consequently, it is very plain that on the basis of the usual plan of utilizing city credit the city is in no position to embark on a rapid transit program requiring the expenditure of any substantial sum that a reasonably adequate rapid transit system would make necessary, even if the cheapest type of construction is adopted. The city cannot turn to private capital for assistance. This would require a reversal of the existing public policy and would make it difficult to unify the old system and the new.

All the money for construction must be available for use as required during the construction period. Any financial plan to be effective must accomplish this. The total rapid transit cost of one mile of tunnelway should be distributed in accordance with the foregoing benefits as follows:

	Cost per Mile of Double-Track Tunnelway	Per Cent of Total
By at-large assessment on the city, to cover benefits derived by the city at large, for one-fourth of the permanent way cost...	$800,000	17
By proximity assessment on the local district, to cover benefits that accrue to the property in the vicinity of the lines, for three-fourths of the permanent way cost.	2,400,000	51
By mortgage bonds, to cover the benefits to the rider, for cost of the equipment...	1,500,000	32
Total	$4,700,000	100

The permanent way consists of the structure, tracks and stations. The equipment consists of the power stations, transmission, signals, yards, shops and cars.

For the combination of tunnelway and elevated line, the city and benefited property owners would pay for permanent way and real estate $2,000,000 per mile, or 57 per cent of the total, while the amount raised by mortgage bonds for equipment would remain $1,500,000, or 43 per cent of the total cost.

ASSESSMENT PLAN IS NOW USED FOR OTHER MUNICIPAL PROJECTS

There is nothing new in the principle of such an assessment plan. The city and benefited property pay for the streets by assessment. The sewers are paid for in the same way. In other places property benefited is also assessed to pay for the parks. And under the Ohio conservancy law the cost for works to prevent flood damages is assessed against the property protected. Assessment to pay for rapid transit does not differ in principle from any of these.

Financing a rapid transit system in this way will mean the adoption of a pay-as-you-go policy, or mean that the present generation will pay for the rapid transit facilities required now. This is as it should be. Future generations will have their rapid transit facilities to pay for in their time. Therefore as little of the cost as is possible should be passed on to the future.

The at-large assessment of the city is to be spread over the total assessed valuation of the city, including land, buildings and personal property, for one-fourth of the cost of constructing the permanent way, or for about 17 per cent of the total cost of the tunnelway, including construction and equipment. There will be no interest or sinking fund charges upon these assessment funds, because they have not been borrowed and therefore will not have to be paid back.

The assessment is to be collected in annual installments distributed equally over the seven-year construction period, and for the tunnelway system, per mile of route per year, will amount to about $114,300.

The at-large assessment for a tunnelway project would be only about 4.73 cents per $1,000 of total assessed valuation per year per mile of route, based on the 1923 valuation of Detroit and the inclosed and contiguous areas benefited, including Highland Park, Hamtramck and Springwells. For 10 miles of route the amount would be 47.3 cents per $1,000, and even for 50 miles of route the assessment would only be $2.37 per $1,000 per year.

This assessment is just like any other taxation, excepting that none of the funds raised by it will be used to pay interest on borrowed money, but instead, all of the funds will be converted directly into a self-supporting asset—in other words, into the city's rapid transit system, that in turn will immediately proceed to enhance the value of the property assessed.

The above figures do not include interest during construction on the permanent way cost, because under the assessment plan no money is borrowed for this purpose. If all the money for the project is raised in the usual way by bond borrowings, then these figures will be increased by $200,000 and $100,000 per mile, respectively. In other words the permanent way item of cost will be $3,400,000 per mile of two-track line instead of $3,200,000 for the tunnelway project, and $2,100,000 per mile instead of $2,000,000 for the combined project.

The proximity assessment on the local district is to be spread over the local districts traversed by the rapid transit lines for approximately one-half mile on each side of the lines. The assessment is to be made on the land value only in proportion to the benefits derived, and for three-fourths of the construction cost of the permanent way, or about one-half of the total cost of the project, including construction and equipment. This assessment also is to be collected in seven annual installments corresponding to the seven years of construction, and for the tunnelway system, per mile of route per year, will amount to about $343,000.

Not all the land will be benefited alike. The benefit at the stations and along the line will be greatest. It will decrease from this maximum to a minimum at about a half-mile distance from the line on each side. Therefore, the assessments will vary in a corresponding manner with respect to the proximity of the land to the stations and line. To simplify its application the assessment will be distributed over six zones at annual rates per square foot on the land only. The same relative rates will be applied at every station, whether it is located in the center of the city or on the outskirts of the city. The assessment rates are as follows:

Approximate Zone Limits from Stations in Feet	Annual Proximity Assessment Rates, Cents per Sq.Ft.
0-250	7
250-500	5
500-1,150	3.5
1,150-1,800	2.25
1,800-2,450	1.5
2,450-2,640	1

Consider as an example that the depth of the average lot is 120 ft. Assume that the lot is located at a station, thus coming in the 7-cent rate. Then the assessment would be $8.40 per front foot per year. If the lot were 100 ft. in depth, the assessment would be $7, and if it were 150 ft. deep, $10.50 per front foot per year. Again, assume the lot was located farthest away from the station, in the 1-cent zone, then the assessments would be $1, $1.20 and $1.50 per front foot per year for lots 100, 120 and 150 ft. deep respectively.

Just as in the case of the proposed assessment on the city at large, there will be no interest charges against local assessments. This money will not have to be paid back to any one. The funds will be immediately converted to the city's rapid transit system and begin at once still further to enhance the value of the property that has paid the assessment.

As illustrating the local benefits that result from furnishing rapid transit two cases were cited in the report that had been analyzed in detail by the New York City Club. As soon as the New York rapid transit program was announced and construction was begun the land started to increase in value.

RAPID TRANSIT GREATLY ENHANCES PROPERTY VALUES

In upper Manhattan, above One Hundred and Thirty-fifth Street, for a distance of about 4.4 miles the land affected rose from a total value of $47,306,000 in 1900, before the rapid transit line was constructed, to about $116,608,000 in 1907 after operation was under way. This represents an increase of 147 per cent during the seven-year period. It was estimated that the normal increase in values would have been about 43 per cent in the same time. The cost of constructing (not equipping) the rapid transit line traversing this district was only a little over $7,000,000, so the increase in values was about seven times the construction cost.

In the Bronx over a strip one-half mile wide each side of the line there was a similar total increase from an original value of $33,242,000 to about $78,047,000—an increase of about 134 per cent, as compared with a normal increase of about 40 per cent. This section of line cost some $5,700,000 to construct, so the enhancement here due to rapid transit was nearly five and one-half times the cost of the facility.

By means of rapid transit fund certificates, as an extension of payment for each of the seven annual proximity assessments, the landowner will be given the option of spreading each annual assessment in a number of payments over a period of years instead of paying the whole annual amount down at once, thereby making it easier for him to bear his share of the assessment.

The assessments of those who elect to make use of the rapid transit certificates will be combined into a single obligation and made the security for a district loan to be covered by series certificates of indebtedness, which will be marketed by the city in behalf of the property owners. Thus the city will at once realize on the annual assessment by transferring the combined obligations of such taxpayers to investors who will carry the load for a term extending beyond the annual payment period, thus permitting payment in smaller installments than are required by the immediate needs of the city.

This plan is an expedient to lighten the annual burden to the taxpayer, but it will cost him in the end more than if he paid the annual assessment in cash, by the amount of interest he will be required to pay in addition to the principal.

Mortgage bonds are to be issued covering the entire cost of the equipment and cars, or covering about one-third of the total cost of the project, including construction, equipment and cars. These mortgage bonds are to be authorized at the start and issued as needed. They represent the assessment against the rider for the benefits he is to derive from the rapid transit service.

The bonds, being borrowed money, will bear interest and sinking fund charges at the rate of 6 per cent. In this respect they differ from at-large and proximity assessments, which have no interest and sinking fund charges to bear. The interest charged on the bonds during the construction period is included in the amount of the bonds, but after operation begins interest and sinking fund charges are to be paid out of the operating revenues.

In order that the financial plan may be accomplished and the rapid transit program carried out efficiently, the procedure should be as follows:

(a) The Legislature should be asked to amend the present law to permit the methods of assessment herein proposed.

(b) An amendment should also be enacted creating a rapid transit commission; setting up the machinery to guide and control its proceedings; and empowering it to obtain, hold and disburse all rapid transit funds.

(c) The people of Detroit should be offered an amendment to the charter adopting the law as enacted.

(d) Providing the charter amendment carries, the people of Detroit will then be asked to approve a plan of rapid transit routes.

Operating Aspects of Kansas City Safety Train*

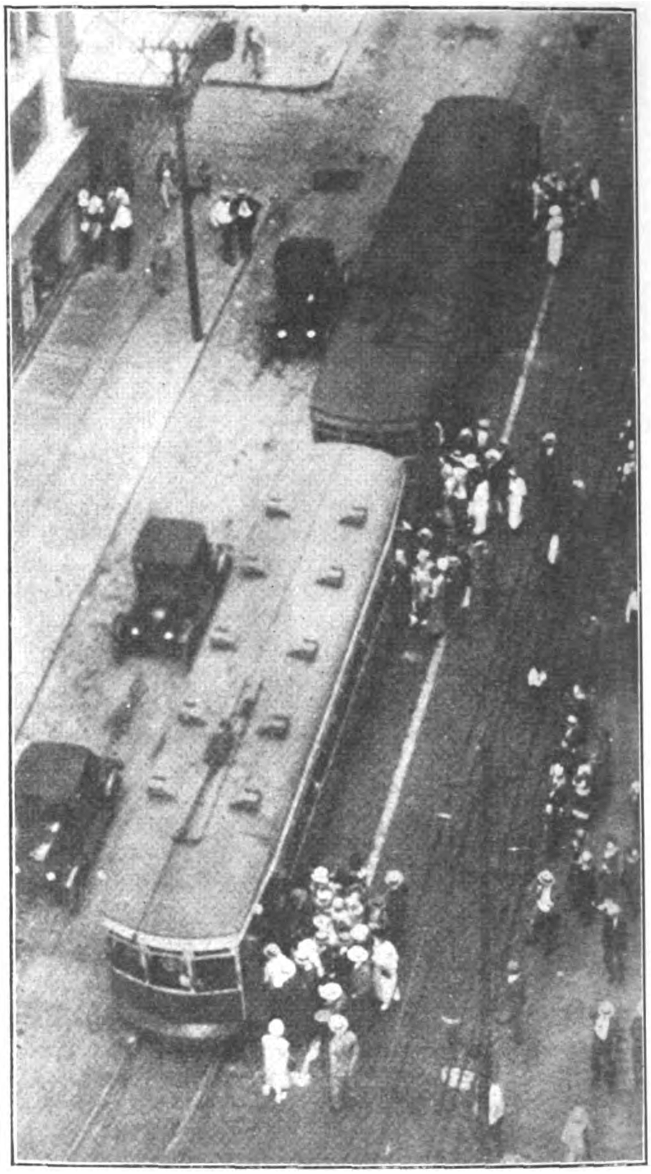
One-Man, Two-Man Car, Three-Man Train Adds Greatly to Flexibility of Operation and Introduces Economies as Well as Providing Better Service —Company Enthusiastic About Results

THE safety train developed by the Kansas City Railway has now been in operation long enough to determine its advantages from both the service and economy standpoint. The company claims as the advantages for this one-man, two-man, three-man train that it provides economical base schedule operation, maximum rush-hour capacity, minimum traffic delay and congestion, improved distribution of car loading, great flexibility in operation, practical and satisfactory adjustment of the extra list and greatly improved service for the public, with substantial reduction in operating expense.

The mechanical features of the cars comprised in the safety train were covered in an article in the ELECTRIC RAILWAY JOURNAL for March 10, 1923, page 402. To summarize here, these cars embodied several new and original features, as follows:

1. The pioneer use of complete safety devices on double-truck cars with multiple-unit control.
2. The first successful operation of 600-volt main power bus through the automatic coupler, this design including new drum switch design and blow-out coils and original safety features.
3. The original installation of automatic throw-over from trolley to battery supply for energizing the train control circuit, when it is desired to use the motors for regenerative braking in case the trolley pole should come off the wire.
4. An original platform arrangement designed to permit the cars to be used for either one-man or two-man operation, and including safety features developed originally for this company to permit the street fare collector scheme.

The company summarizes the results which have been achieved from their use as follows: A 50 per cent increase in number of non-rush hour seats; a 20 per cent increase in the number of rush-hour seats; 12.6 per cent increase in trip miles; 20.7 per cent decrease in platform expense despite a 5-cent an hour premium for one-man operation; 23.7 per cent decrease in man-hours and 16 per cent fewer total men required to operate the schedule.



Passengers Boarding at the Four 57-In. Door Openings of a Kansas City Safety Train

The train is shown standing on a 10 per cent grade. The two center doors are handled by conductors on the cars and the doors at the extreme ends of the train are handled by street collectors.

These new cars of the Kansas City Railway are operated in the non-rush hours as single-car units in charge of one man, and the street collectors are not on duty. In the rush hours they are coupled together and operated as two-car trains with three men, supplemented by street collectors who take positions at the front door of the forward car and at the rear door of the second car at important loading points.

In addition to the multiple-unit control and the arrangement for one-man or two-man operation, the flexibility of the train is further enhanced by the fact that the cars may be coupled or uncoupled at any point on the system without adding or removing equipment. As single units, these cars can be operated by one man or two men, and when in trains they may be operated with two, three or four men, as desired. No special storage house or terminal track arrangement is necessary for handling these cars. They can be uncoupled at short loop points or at any point on a line and one car used to fill the space with a minimum of inconvenience to passengers.

The company considers that in using these single units with one man on a heavy line it is possible to furnish a more satisfactory service than with ordinary two-man operation, as part of the economy is shared with the public in reduced headway. In the non-rush hours the double-truck car with one man affords a comfortable riding unit, usually providing a seat for every passenger. In the rush hour trippers manned by two employees meet the base-schedule cars to which they are coupled, and this two-car unit with three men, aided by street collectors, goes through the rush period. The trippers with the two men then return to the carhouse, leaving the single one-man unit to continue on the base schedule.

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*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

FARE COLLECTION PLAN

The control of passenger movement and the system of collecting fares under different methods of operation have been satisfactorily worked out. A swinging gate on the platform can be locked open during two-man operation. For one-man operation it is arranged to swing only outward, thus separating incoming and outgoing passengers. When the operation is changed from one man to two man the fare box is moved from the front platform to the rear, and vice versa.

The scheme of using street collectors has been in use by the Kansas City Railway for some fifteen years, but it becomes of special importance and value in connection with the safety trains. Not only is the schedule speed increased by reducing the loading time, but carloads are equalized, giving more efficient use of the equipment. Sixty-three street collectors are used regularly by the company during the rush hours at heavy loading points in the business and industrial section, and on such special occasions as ball games, circuses, etc. Extra men are used for this duty.

Emphasis is made of the point that the street collectors are more than merely human fare-collecting devices. They are of material assistance in selling the service. Together with the three men on a train, they make five employees at heavy loading points who specially serve the public in the way of information and assistance, as well as expedite the service. The use of street collectors also brings about some reduction in the loss of fares.

Symbols Replace Dates on New Los Angeles Transfers

This New Scheme Eliminates the Waste Which Must Occur with Dated Transfers—Saving Thus Effected Would Be Very Important on Large System

A NEW type of transfer in which symbols replace printed dates has been introduced by the Los Angeles Railway. The change is said to have resulted in a considerable saving over the system formerly used as it eliminates the necessity for a surplus supply of transfers for each conductor.

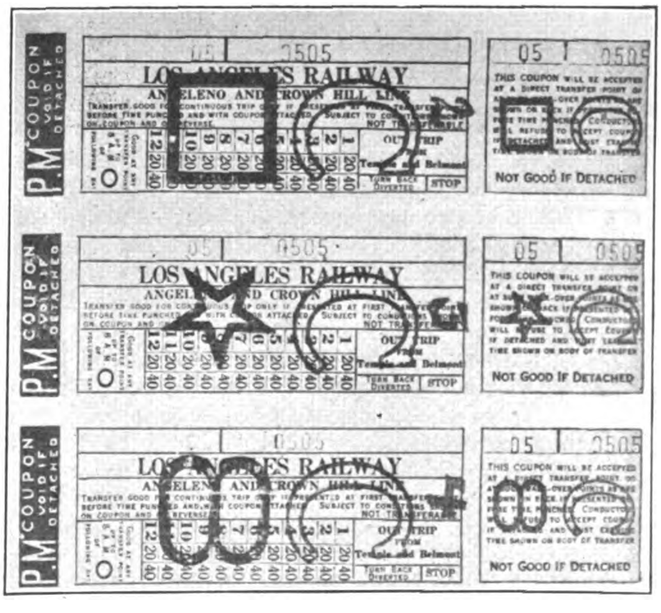
Fourteen different symbols are used to distinguish transfers in the new system, a few of which are illustrated herewith. These are used without any regular sequence, the transfer bureau deciding that a certain type shall be used for each day, but not divulging the information until the day of issue. For instance, if the transfer bureau decides that a star shall be the designating symbol for the fifth day of the month, the information will be transmitted to the various carhouses and a large metal sign carrying the designation, as illustrated, is conspicuously displayed to inform the trainmen. All transfers issued to conductors for that day will bear the design of the star. Since the passengers do not know in advance what design will be used, the chance of using old transfers is cut to a minimum.

A Metal Sign Bearing the Same Symbol as the Transfer Is Displayed to Inform the Conductors

Transfers formerly used by the company had the letter of the line, the day, month and date superimposed with the date figure in the largest type. In rush hours it was possible to pass a transfer of the corresponding day of a previous month.

Another innovation in the new transfer is that a p.m. coupon is provided, which cuts the number of transfer forms in two. Heretofore different transfers indicated "In" or "Out" trips, and different colored printing designated a.m. or p.m., making it necessary for a conductor to carry four sets of transfers.

With the change from dates to symbols, a considerable saving in printing is effected. Formerly all unused transfers marked for a certain date had to be thrown away, whereas with the new system, unused transfers are saved and reissued the next time the particular symbol is chosen at the designating mark. Since about 330,000 transfers are used on an average day, a very considerable saving is effected.


P.M.
COUPON VOID IF DETACHED
LOS ANGELES RAILWAY
NOT GOOD IF DETACHED

Three of the Designs Used to Designate Dates on Los Angeles Transfer

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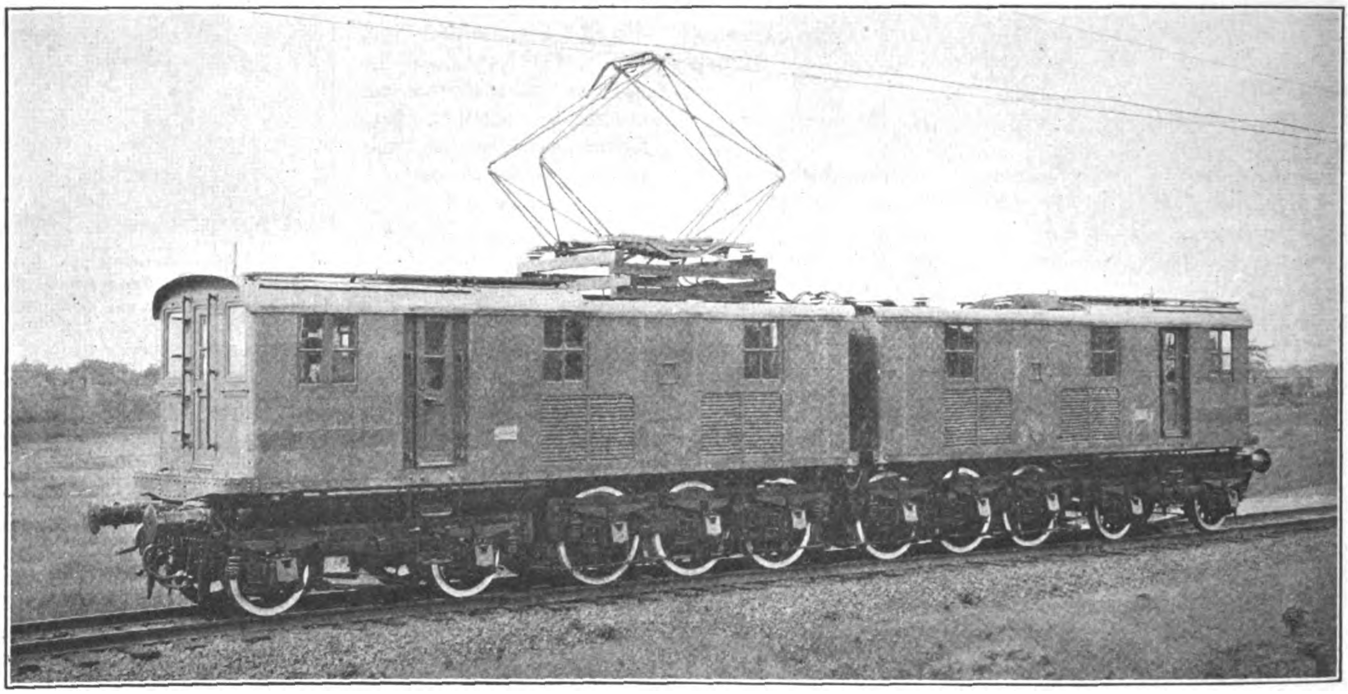
Mason Starring, president United Railway Investment Company, and Moritz Rosenthal, director of the Market Street Railway, San Francisco, have gone to San Francisco for a conference with city officials on the proposed sale of the Market Street Railway to the city. This matter has been a subject of previous discussion. The question of the valuation at which the property will be taken over is, of course, the important question to be settled.

Electric Locomotives Tested at Erie

120-Ton Paris-Orleans Locomotive Designed for High-Speed Passenger Service in France Develops 105 M.p.H. in Preliminary Tests—Mexican Railway 150-Ton Freight Locomotive Has "Tug-of-War" with Mikado Type Steam Engine



This Paris-Orleans Locomotive Was Designed for Passenger Service at Speeds Up to 80 M.p.H.

TESTS of two new electric locomotives built by the General Electric Company and the American Locomotive Company for foreign roads attracted a number of engineers and railroad men to Erie, Pa., on Dec. 4 and 5. The locomotive built for the Paris-Orleans Railway was run over the test track at speeds between 62 and 81 m.p.h. In preliminary tests run Dec. 2 a speed of 105 m.p.h. had been reached. There was no apparent tendency toward objectionable movements which might have injurious effects upon the track. Records were also obtained by means of the otheograph, described in this paper Aug. 25, page 294, which would indicate freedom from nosing at high speeds. Examinations of the track showed complete absence of any detrimental effects.

There was also exhibited the new Mexican Railway freight locomotive, an exhibition run being staged on the tracks, together with a "tug-of-war" contest with a Mikado type steam locomotive, and a regenerative braking contest. During this test the electric locomotive, connected to send power back to the line, was hauled by the steam unit at a speed of about 14 m.p.h., the steam unit operating at full capacity. As high as 1,800 hp. was sent back into the system.

SOME DETAILS OF THE PARIS-ORLEANS LOCOMOTIVE

In order to determine the type of passenger locomotive to be used on the 1,500-volt electrified lines of the Paris-Orleans Railway, orders were placed with various manufacturers for sample locomotives having approximately 80 tons on drivers and designed for maximum speeds up to 130 km. (80.3 miles) per hour. The G.E. locomotive is of the gearless type, as shown in the illustration. Each main driving truck has three axles, each carrying the armature of a bipolar gearless motor. The truck frame consists of two steel plate side frames bolted to two end transoms and two intermediate transoms. The journals are of the collarless type, and the end thrust of the axle is taken up by a bronze and babbitt liner located on the outside of the wheel hub and running against a cast steel journal box.

The guiding trucks are also made up of steel plate side frames riveted and bolted to structural steel end frames and cross transoms. A longitudinal center member of structural steel supports a center plate for carrying a portion of the weight of the locomotive at the inner end of the truck. The outer end of this member carries the truck portion of the centering device, which forms a support for a portion of the weight of the superstructure.

A platform built up of structural steel longitudinal and cross members is bolted to each driving truck and supported near its outer end by the roller centering device resting on the guiding truck.

Each cab is of the box type containing a compartment at the outer end for the operator and the remainder for housing the apparatus. The outer end of the cab is tapered to a width of 8 ft. 7½ in., to conform to the specified clearance lines when passing around a minimum radius of 260 ft.

The driving motors are built for operation at 750 volts per commutator, with two motors in series. The field poles, field coils and brush-holders are mounted on the truck transoms, and the truck platform and cab structures form a part of the magnetic path. The nominal one-hour rating with all covers off and operated on tapped field (75 per cent) is 395 French hp.* at 675 volts and 408 French hp. at 750 volts. The continuous rating with blowers, based on a temperature rise of 120 deg. C., is 355 French hp. at 675 volts.

The under sides of the transom are covered with steel plates, and openings are provided for the forced ventilation. While the locomotive is not now equipped for regenerative electric braking, space is provided for the installation of equipment for this purpose if desired.

The control equipment is type PCL, electro-pneumatically operated, non-automatic, giving twenty-three resistance steps and eight running points with various groupings of the motors.

For speeds above the full field running connections, tapped field positions are provided. Two of these steps can be obtained in the series and series-parallel position and one in the full parallel position. Provision is made for disconnecting the motors on either half of the locomotive in emergency, so that the three remaining motors can be operated in series.

A master controller is located on the left-hand side of each operating cab, energizing the control circuits by means of current from a 72-volt storage battery.

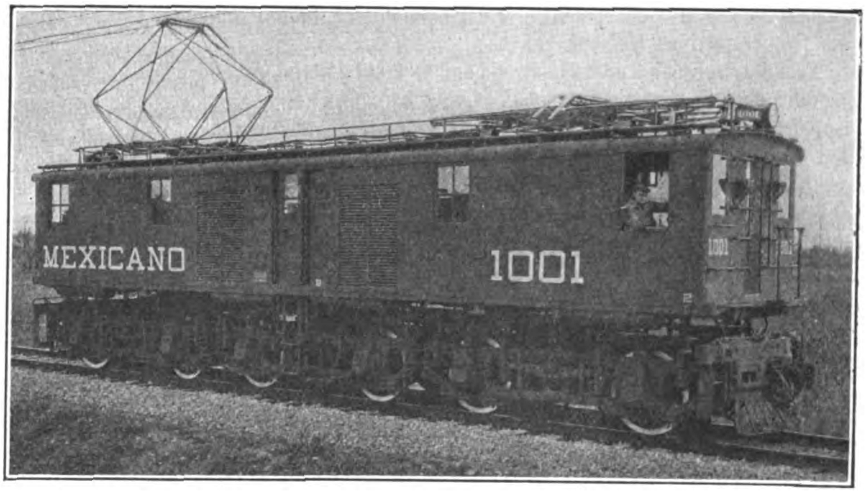
Overload and short-circuit protection is secured by a high-speed circuit breaker which trips and inserts resistance in the circuit. After the resistance is inserted, a pair of line contactors then opens the circuit. This reduces the damage that can be done and protects the substation apparatus by quickly eliminating excessive power demands.

The auxiliary equipment includes air compressors, blowers and heaters which are operated through a separate circuit taking power from the 1,500-volt trolley. Forced ventilation for the traction motors is obtained by multivane type blowers, one of which is located directly above each motor. The three blowers on each driving truck are direct connected to an inclosed series-wound 1,500-volt motor, and the two motors may be connected in series to reduce power consumption when the locomotive is operated at light loads.

WEIGHTS, RATINGS AND DIMENSIONS OF PARIS-ORLEANS ELECTRIC LOCOMOTIVES

Electrical data:	
Nominal voltage of system (d.c.)	1,500
Tractive effort at one-hour rating and 1,350 volts, kg.	6,630 (14,586 lb.)
Tractive effort at continuous rating and 1,350 volts, kg.	5,700 (12,450 lb.)
Tractive effort at 30 per cent tractive coefficient, kg.	21,800 (47,960 lb.)
Speed at one-hour rating and 1,350 volts, km.p.h.	96.5 (60 m.p.h.)
Speed at continuous rating and 1,350 volts, km.p.h.	101 (63 m.p.h.)
Number and type of motors	Six G. E. 101-A (750/1,500 volts)
Total horsepower of locomotive at one-hour rating	2,370*
Total horsepower of locomotive at continuous rating	2,130*
Mechanical data:	
Track gage, meters	1.45 (56½ in.)
Wheel arrangement	4 — 6 + 6 — 4
Diameter of drivers, mm.	1,200 (47.2 in.
Diameter of guiding wheels, mm.	915 (36 in.)
Total wheelbase, meters	16.32 (53 ft. 6 in.)
Maximum rigid wheelbase, meters	2.85 (9 ft. 3¼ in.)
Width over all, meters	2.93 (9 ft. 6 in.)
Length over buffers, meters	19.02 (62 ft. 0 in.)
Height over trolley, locked down, meters	3.84 (12 ft. 6 in.)
Weights:	
Total weight on drivers, kg.	72,600 (159,720 lb.)
Weight per driving axle, kg.	12,100 (26,765 lb.)
Total weight on guiding axles, kg.	35,800 (79,200 lb.)
Weight per guiding axle, kg.	8,950 (19,690 lb.)
Electrical and air brake equipment, kg	46,400 (102,880 lb.)
Mechanical equipment, kg.	62,000 (138,600 lb.)
Total weight, kg.	108,400 (238,480 lb.)

The air brake equipment is of the French Westinghouse type for double-end operation and for control of both locomotive and train. Compressed air is furnished by two CP 32-A 1,500-volt compressors having a total piston displacement (at the low pressure piston) of about 3,600 liters (127 cu.ft.) per minute when delivering air at a pressure of 10 kg. per square centimeter (142 lb. per square inch). The compressor is of a two-stage type with horizontal cylinders fitted with single-acting pistons.


The Locomotive for the Mexican Railway Is for Heavy Mountain Grade Service

THE MEXICAN LOCOMOTIVES ARE FOR FREIGHT SERVICE

The ten 150-ton, 3,000-volt locomotives to be used on the initial electrification of the Mexican Railway are of the geared type, and are designed for slow-speed freight service.

A single cab is mounted on two equalizer frames, which in turn are carried upon three two-axle articulated trucks. A motor is geared direct to each axle with twin spring gears.

The three trucks have steel side frames, to which the end frames carrying the draft gear and articulated joints are bolted. The superstructure is carried on center plates on the truck transom, bolted to the side frames at their midpoint, and the whole is carried on equalized semi-elliptic springs.

On each of the six axles there is a twin-geared G.E. 278-A railway motor with forced ventilation. These motors are designed to operate two in series on 3,000 volts. Each motor is supported on its axle by suspension bearings and on the transom by a spring nose support. An eighteen-tooth forged steel pinion is mounted on each end of the armature shaft and meshes with a ninety-tooth cushion type gear on the axle. This design permits a small movement of the rim about the gear center, thus tending to equalize the stresses in the gears and pinions and to minimize the shocks on the teeth.

The auxiliary machinery consists of a 3,000/1,500-volt dynamotor which has a 4-kw., 65-volt control generator mounted on a shaft extension, a 1,500-volt regenerative exciter set, two 1,500/3,000-volt motor-driven blowers and two 1,500/3,000-volt air compressors. The dynamotor provides 1,500-volt power for operation of the blowers, compressors and the regenerative exciter set. The control generator furnishes current at 65 volts for lights, headlights, foot warmers, control circuits and for charging the storage battery.

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*French horsepower of 736 watts.

The two air compressors are of the two-stage horizontal-cylinder type and have a total piston displacement of 150 cu.ft. per minute when delivering air against 130-lb. pressure. They operate two in series on 3,000 volts.

The air brake is Westinghouse No. 14 EL, double-end, straight and automatic equipment, arranged for double-heading locomotives. Provision is made to prevent application of the air brakes on the locomotives during regenerative braking, while the brakes may be applied on the remainder of the train.

The locomotives are equipped with type PCL electro-pneumatic control for non-automatic, multiple-unit operation. The master controllers are arranged to give a total of thirty-one accelerating steps and nine running points, which for a tractive effort of 50,000 lb. and 2,700 volts on the contact line correspond to speeds of approximately 5.4, 6.0, 6.75, 11.4, 12.8, 14.2, 17.4, 19.6 and 21.6 m.p.h. This range of speeds is obtained by connecting the motors six in series, three in series in two parallel circuits, and two in series in three parallel circuits. One full-field point and two reduced-field points are included on each connection.

REGENERATIVE BRAKING IS PROVIDED TO CONTROL SPEED ON DOWN GRADES

Regenerative braking on the down grades is accomplished by exciting the fields of the traction motors by the regenerative exciter. Fifteen regenerating steps are provided for on the master controllers for each of the three motor groupings.

The main motor circuits are protected by a quick-acting circuit breaker which serves as a line breaker, as well as to give overload protection. Current is collected through one or both of two pantograph trolleys, which have a range of 15 ft. 5 in. to 24 ft. above the rail. They are raised and held against the wire by air pressure and are retracted by gravity when the air pressure is released.

The cab is 47 ft. 6 in. long and 10 ft. wide. An apparatus compartment is in the middle of an engineman's cab 5 ft. long at each end. The rheostats extend each way from the center of the cab about one-half the length of the apparatus compartment. Their height is approximately 3 ft. Near each end is a ventilating flue to carry off the heat. The roof of the rheostat compartment is insulated against heat and is used as a shelf upon which the auxiliaries are mounted.

The control apparatus compartment on No. 1 end contains the main switch, quick-acting circuit breaker, lightning arrester, other protective apparatus and some of the accelerating contactors. The corresponding compartment on No. 2 end contains the cam switches for grouping the motors for the different motoring and regenerating combinations, the reverser, the motor cut-out switches and the remainder of the accelerating and field reducing contactors.

The Mexican Railway Company, Ltd., is one of the oldest railways operating in Mexico.. Its main line runs between Vera Cruz and the Gulf of Mexico and Mexico City. The section between Orizaba (about 70 miles inland from Vera Cruz) and Esperanza, a distance of 30 miles, is now being electrified. This section, known as the Maltrata incline, includes the most scenic country in Mexico.

DIMENSIONS AND DATA OF ELECTRIC LOCOMOTIVES FOR THE MEXICAN RAILWAY

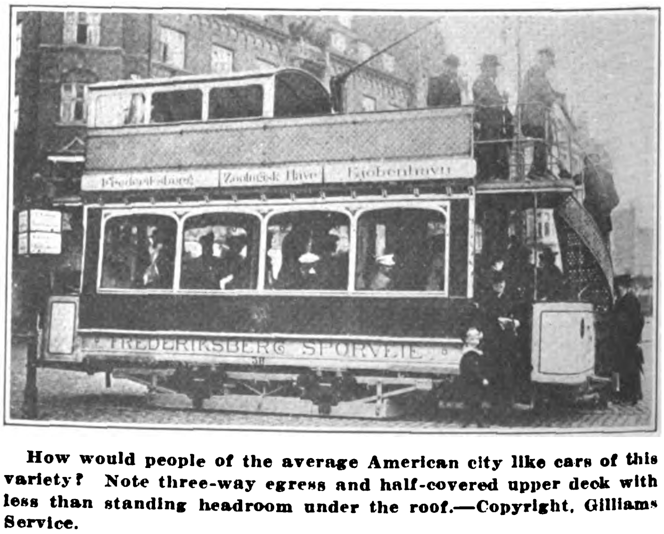
Electrical data:	
Nominal voltage of system, (d.c.)	3,000
Tractive effort at one-hour rating and 3,000 volts, with blowers, lb	54,300
Tractive effort at continuous rating, lb	46,200
Tractive effort at 30 per cent tractive coefficient, lb	92,400
Speed at one-hour rating and 3,000 volts, m.p.h.	20
Speed at continuous rating and 3,000 volts, m.p.h.	20.5
Total horsepower of locomotive at one-hour rating	2,700
Total horsepower of locomotive at continuous rating	2,500
Number of motors	6
Type of motors	G.E. 278-A (1,500–3,000 volts)
Gear ratio	90:18
Mechanical data:	
Track gage, inches	56½
Wheel arrangement	0-4-4-4-0
Diameter of drivers, inches	46
Number of driving axles	6
Total wheelbase	40 ft. 6 in.
Maximum rigid wheelbase	9 ft. 2 in.
Width over all	10 ft. 1¼ in.
Height over trolley, locked down	15 ft. 2 in.
Length inside knuckles	52 ft. 11 in.
Weights:	Lb
Total weight on drivers	308,000
Weight per driving axle	51,300
Dead weight per axle	12,150
Electrical and air brake equipment	135,000
Mechanical equipment	173,000

Because of the mountainous country through which the railroad passes from the sea level at Vera Cruz to the great Mexican plateau, with a change in elevation of some 8,000 ft. in 100 miles, many severe grades and sharp curves are encountered. A difference of 4,000 ft. in elevation exists in the 30-mile section which is now being electrified.

Freight trains weighing 700 tons will be taken up the grade with two electric locomotives, one at the head end and one at the rear. Trains of about the same weight will be brought down the grade with one locomotive by regenerative electric braking. Speeds both up and down grades for freight trains will average about 15 m.p.h.

All but an occasional passenger train can be taken over the grades by a single locomotive. As it is considered unsafe to run trains down the grades and around the sharp curves at more than 20 m.p.h., the same locomotive with the same gear ratio will be used for freight and passenger service. Speeds of passenger trains will average about 18 to 20 m.p.h. both up and down grades, although the locomotives can operate at a maximum speed of 33 m.p.h.

A Street Car in Copenhagen, Denmark



How would people of the average American city like cars of this variety? Note three-way egress and half-covered upper deck with less than standing headroom under the roof.—Copyright, Gilliams Service.

Platform Men Pass Civil Service Tests

San Francisco Requires Applicants for Position of Motorman and Conductor to Take Athletic Examination, Including Ladder Climbing, Horse Vaulting and High Jumping, as Well as an Examination on Relative Capacity and Knowledge of Duties —Each Examination Is Considered of Equal Importance

PROSPECTIVE motormen and conductors must pass an athletic test before being employed on the San Francisco Municipal Railway. They must be able to climb a ladder by their hands, dip on the parallel bars at least five times, vault the horse, and otherwise prove that they are in fit muscular condition, besides passing the more common medical examination for organic troubles and the usual test for eyesight and hearing. The specification for motormen and conductors on the San Francisco Municipal Railway has always called for a rather stiff physical examination, but the requirements have been made more strict recently, partly because the system has no age limit for new men and partly because all employees of the municipal railway now, after the first six months of their employment, automatically become members of the retirement system of the city and county of San Francisco. This arrangement became effective on April 1, 1922.

All employees of the San Francisco Municipal Railway, except executives and one or two experts, come under the civil service regulations. Hence, candidates for the position of motormen and conductors have to be passed by the Civil Service Commission of San Francisco before they are eligible for appointment.

CIVIL SERVICE TESTS

The athletic test for motormen and conductors, already mentioned, has a relative weight for eligibility of 50 on a scale of 100, and a written examination, called a test for relative capacity and general knowledge of duties, also has a weight of 50 on the scale of 100. All of these three tests, except the test on general knowledge of duties, are the same for motormen and for conductors. Applicants must receive a rating of not less than 75 per cent on each of these tests or are rejected. The practice is to conduct first the athletic test. If that is passed successfully, applicants for positions as platform men will receive copies of the rules of the municipal railway to study for the test on general knowledge of duties.

The "athletic test" consists of the following:

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1. *Ladder Work*—Hand over hand, up and down ten rungs; only one hand allowed on each rung; perfect mark, 10 credits.
2. *Lifting 50-lb. Dumbbell*—Five consecutive lifts with each hand. Lifts to be made from lowest reach of arm to highest reach, without aid of jerk or swing, while standing erect with feet close together; perfect mark, 10 credits.
3. *High Jump*—4 ft., 10 credits; 3 ft. 8 in., 8 credits; 3 ft. 4 in., 6 credits; use of springboard not permitted.
4. *Vaulting the Horse*—Perfect vault over horse, 4 ft. 6 in. high, without touching it with any part of body except the hands, 10 credits; good vault (feet slightly touching horse), 8 credits; fair vault (body slightly touching the horse), 6 credits; slide over horse, 0.
5. *Dipping on Parallel Bars*—Five dips at 2 credits each; dips must be made with legs straight and without assistance of kick or swing.
6. *Carrying 150-lb. Sack of Sand*—Sack must be lifted from floor, placed on shoulder and carried up and down six steps; mark 10 credits. No partial credits, and no more than two trials allowed.
7. *Running* (distance about 140 yards)—Eighteen seconds, 40 credits; nineteen seconds, 37½; twenty seconds, 35; twenty-one seconds, 32½; twenty-two seconds, 30; twenty-three seconds, 25; twenty-four seconds, 20; twenty-five seconds, 15; twenty-six seconds, 10; twenty-seven seconds, 5. Fifth seconds to be rated proportionately.

As explained, applicants must also pass a satisfactory medical examination before a physician appointed by the commission. Those unable to hear with each ear ordinary conversation at a distance of 20 ft. or unable to read with each eye without glasses at a distance of 20 ft. letters on Snellen's eye chart marked "30" will be rejected. Applicants for both motormen and conductor positions must also pass a test as to their color vision. They must be citizens of the United States, twenty-one years of age or over, and residents of San Francisco for at least one year preceding the examination. Under the city charter, war veterans are entitled to claim a preference of five credits, but to secure this credit they must file with the commission, with their application for the position, a certificate of honorable discharge or of honorable active service.

WRITTEN TESTS ON INTELLIGENCE

The written examinations on relative capacity and general knowledge of duties are conducted at certain times announced in advance by the Civil Service Commission. The regulations in regard to these examinations are printed and very definite. Thus, during the course of the examination no participant is permitted for any reason to leave his seat, unless he first turns in his examination papers, and he then will be considered as having withdrawn from the examination. Nothing is permitted on the desks of the competitors except the examination booklet and pens and ink and blotters furnished by the commission. Applicants may use their own fountain pens only if those pens are supplied with ink that dries black. Applicants are advised that no questions should be asked of the monitors in charge of the examination because none will be answered. If the applicant thinks he finds cases of ambiguity or oversight in the examination papers or instructions which are the fault of the commission, they will not be discussed during the examination. If the applicant wishes to bring them up, in explanation of his failure to do his work properly or for any other reason, he can make such complaint by writing to the commission within three days after the examination.

The practice in conducting the examination is that each applicant who has passed the athletic test and has applied for permission to take the written test will receive a credential. He keeps this credential until the written examination and it must be shown at the door of the examination room to secure admittance. The candidate is then assigned to a seat and places the credential before him on his desk, leaving it open and face up, so that it can be quickly inspected and collected by the monitor. After the credentials have been collected, the examination booklets are distributed face up.

The written examination for a motorman or a conductor lasts about forty-five minutes. If a person wishes to take an examination for both positions, he is permitted to do so. This will take about fifteen minutes longer.

The time spent in these examinations is very definitely regulated by gong signals. At the first gong signal, the applicant is told to take up his pen and write his name and address on a blue gummed identification slip which he finds attached to the cover of his examination booklet. After writing his name on this sheet he is told to fold it over and paste it down by means of a gummed edge that is provided, and he is warned not to write anywhere else on the examination paper his name or other identification mark.

Altogether there are six tests, and the time for the beginning and ending of each is indicated by a gong signal. At the close of the forty-five minutes, the gong is rung three times. This means that all applicants for positions must stop writing and must rise and stand by their desks until the monitor collects the examination booklets. Then at four strokes of the gong applicants leave the hall.

EXAMINATION ON RELATIVE CAPACITY

There are five examinations on relative capacity, and, as explained, these are the same whether the candidate wants employment as a conductor or as a motorman. Each examination question is so drafted that the answer is very brief and can be written on a blank line next to the question. Figuring for the arithmetical test must be done on the back of the cover sheet of the booklet.

The first test in relative capacity is on some simple questions in arithmetic. A few typical questions taken from the examination sheet of Jan. 31, 1922, follow:

At 7½ cents each, how much will a dozen power fuses cost?

How many weeks will it take to pay for a $35 uniform at $10 down and $5 at the end of each week?

If a conductor starts on his run with $5.75 and collects seventeen 5-cent fares, how much will he then have?

How many 5-cent fares will it take to pay for the damage done in a collision with an automobile if the cost was $150?

The second examination is on "sentence meanings." There are twelve groups of four sentences each, and the applicant in this test is required to make a cross mark in the parentheses before the sentence which has most nearly the same meaning as the numbered sentence heading the group. The upper part of a recent examination sheet, with four typical questions, is reproduced below:

TEST 2 SENTENCE MEANING Relative Capacity

In each group of sentences below, make a cross (×) in the parentheses before the one sentence which has most nearly the same meaning as the first sentence (in capital letters). The first example is already marked correctly. Work until the gong rings and then start on Test 3. *Any example where more than one sentence is marked in any way will be counted as incorrectly answered.*

1. MAKE HAY WHILE THE SUN SHINES.
   (×) Take advantage of your opportunities.
   ( ) Don't work too hard.
   ( ) Don't stay up too late.
2. MANY ARE GOOD BECAUSE THEY CAN DO NO MISCHIEF.
   ( ) Evil sees as evil thinks.
   ( ) The good can do no wrong.
   ( ) The cat is honest when the meat is out of reach.
3. WHERE THE WILL IS READY THE FEET ARE LIGHT.
   ( ) Where there's a will there's a way.
   ( ) Expression is the dress of thought.
   ( ) A burden which one chooses is not felt.
4. FIGS DO NOT GROW ON THISTLES.
   ( ) Great oaks from little acorns grow.
   ( ) Good does not come from evil.
   ( ) Faint praise is often strong censure.

The third test is that of "reasoning by analogy." Here the applicant is required to check one of four words which most correctly completes a definite sentence. Here also an example is given as shown below, the proper word being underscored in the first example of the four quoted taken from the examination paper.

TEST 3 REASONING BY ANALOGY Relative Capacity

In each example below, draw a line under the only one of the four words in the column which is the right word to complete the sentence. The first example is already marked correctly, for roar is what a LION does just as bark is what a DOG does. Answer as many as you can before the gong rings; then begin on Test 4. *Any example where more than one word is underlined will be counted as incorrectly answered.*

DOG is to BARK
as LION is to
zoo
roar
animal
man

FLOORWALKER is to STORE
as POLICEMAN is to
uniform
badge
street
authority

STREET CAR is to WAGON
as FAST is to
wheel
trolley
slow
horse

RULER is to LENGTH
as CLOCK is to
strike
time
second
wood

CRIMINAL is to PRISON
as PATIENT is to
jail
hospital
court
medicine

FRAME is to PICTURE
as LAKE is to
island
water
drawing
river

STREET CAR is to PASSENGER
as PATROL WAGON is to
car barn
ticket
fare
prisoner

DOG is to OLD
as PUP is to
kitten
young
small
play

Test 4 is on "word knowledge." Here the applicant is required to draw a line under the one word which in each group means the opposite or most nearly the opposite of the top word in each group of five words. In the first example, "soft" is underlined because it means the opposite of "hard." Six examples are given from the examination paper.

TEST 4 WORD KNOWLEDGE Relative Capacity

In each of the lists below, draw a line under the one word which means the opposite or most nearly opposite of the top word in the list. The first one is already marked correctly—"soft" is underlined because it means the opposite of "hard." Answer in order as many as you can until the next gong signal, then start on Test 5. *Any example where more than one word is underlined will be counted as incorrectly answered.*

HARD
hardy
soft
smooth
pliant

CLEAN
lean
dirty
urge
screen

FROM
upon
form
by
to

VALLEY
mountain
river
mine
gravel

COMMON
cheap
law
unusual
costly

MARRY
ceremony
divorce
court
engage

FORGET
idea
memory
remember
vision

INNOCENT
guilty
proof
convince
doubt

REVEAL
congeal
conceal
relate
veal

MINUS
plus
minor
minority
bonus

CIVIL
civic
martial
marital
revile

MENTAL
brain
nerve
thought
material

CORRUPT
eruption
honest
home
correct

AMIABLE
surly
amenable
pliable
liable

BLISS
lass
blithe
aged
agony

The fifth and last examination under relative capacity is on penmanship. Here the applicant is asked to copy line for line and word for word the way it is printed in the examination sheet the following pledge:

"I pledge allegiance to my flag, to the Republic for which it stands; one nation indivisible, with liberty and justice for all."

There are spaces where this pledge can be copied a number of times until the gong sounds for the next examination.

KNOWLEDGE OF DUTIES

The final test is on knowledge of the duties of the position for which the man has applied. In each examination there are 100 questions relating to practical details of the services with which the applicant has presumably become familiar through a study of the rule book. These questions are arranged so that they can be answered very easily if the applicant knows the right answer. The heading of the examination blank for conductor with the first eight questions, two of which are answered as examples, as reproduced below, is followed by several questions in similar form from the examination paper for motormen.

TEST 6 KNOWLEDGE OF DUTIES CONDUCTORS

Some of the following statements are true and some are false. If the statement is true underline TRUE. If the statement is false, underline FALSE. Do as many examples as you can before the next gong signal; then stand up and remain silent in your place until the following gong signal. (*See front cover.*) *Any example where both true and false are underlined will be counted as incorrectly answered.* The first two statements are samples correctly underlined.

1. TRUE FALSE The Bulletin Board must be examined daily for special bulletins posted thereon.
2. TRUE FALSE Ignorance of rules will be accepted as an excuse for violation of same.
3. TRUE FALSE Verbal orders of subordinate officials must be promptly obeyed.
4. TRUE FALSE "Oversleeps" are not entered on the employee's record.
5. TRUE FALSE The official badge, punch, and cap ornament will all be furnished by the Railway.
6. TRUE FALSE The loss of rule book must be reported immediately to the Car Dispatcher, or person in charge of the office.
7. TRUE FALSE The record kept of each employee should be filled out in careful detail and made as full as possible.
8. TRUE FALSE The penalty for the fourth oversleep in a calendar month is ten days' suspension.

TEST 6 KNOWLEDGE OF DUTIES MOTORMEN

27. TRUE FALSE Motormen will recognize buzzer signal both to stop or to start car.
28. TRUE FALSE Except when regulated otherwise, cars must be brought to a full stop at street railway intersections.
29. TRUE FALSE Except when regulated otherwise by special bulletin, cars will stop at the near side of all intersecting streets to receive and discharge passengers.
30. TRUE FALSE When stopping at a painted stop mark the motorman must stop car with fender roll four feet behind such stop mark.
31. TRUE FALSE The motorman must close front gates immediately after starting car.
32. TRUE FALSE A motorman may start car on signal from conductor collecting at front gate.

No credit is allowed in the examination of either motormen or conductors for previous experience.

In spite of the rather rigorous type of examination required, it is interesting to note that a fairly large number of men are able to pass both athletic and written tests. Thus, in the last examination held, the physical test for motormen was taken by 695 applicants, of whom 620 passed. The same test for conductors was taken by 701 applicants, of whom 615 passed. The written test for motormen was taken by 574 persons, of whom 337 passed. The written test for conductors was taken by 575 persons, of whom 370 passed.

TESTS FOR INSPECTORS

Inspectors on the San Francisco Municipal Railway are promoted from the ranks of the motormen and conductors. The examination for inspectors is somewhat similar to that required of motormen and conductors, except that no athletic test is required. There are the four examinations on relative capacity and the one on penmanship, quite similar to those already described for motormen and conductors, but the examination on knowledge of duties covers, of course, the duties of the office which the applicant is seeking. The questions are arranged, however, in a similar manner to those for motormen and conductors, so that the applicant may simply underscore one of two words to indicate his answer to the question. Typical questions from the examination for inspectors, car dispatchers, car starters and receivers are given below:

TEST No. 6 KNOWLEDGE OF DUTIES

INSPECTORS, CAR DISPATCHERS, CAR STARTERS AND RECEIVERS

TRUE FALSE It is the duty of the Receiver to see that the conductors take outfits for their runs at the time called for by the time schedules.

TRUE FALSE It is the duty of the Inspector to see that all conductors' outfits are properly accounted for and restored to their proper places.

TRUE FALSE Before cars are taken out of the barn in the morning the Car Starter must have posted all car numbers and car box numbers.

TRUE FALSE The Dispatcher must arrange the daily detail of crews.

TRUE FALSE The Receiver must provide emergency crews each day for the following day.

TRUE FALSE An employee shall not discuss with passengers the business of the railway in a manner detrimental to its welfare.

TRUE FALSE The Flood Building is at the corner of Powell and Market Streets.

It is interesting to note that out of the 208 applicants who took the last examination for inspectors, 156 passed. A general average of 75 per cent or better is required.

WAGES PAID

The present scale for platform men, effective Sept. 16, 1923, is as follows: Conductors and motormen, 67½ cents per hour; bus operators (recruited from the ranks of conductors to operate one-man buses), 72½ cents per hour; motormen on work car and track grinding car, 72½ cents per hour.

All of these employees are allowed time and a half for overtime after eight hours and twenty minutes, and are required to lay off one day in seven. Eight hours is the basic day for all employees. Each employee has a vacation of twelve days a year with pay.

The municipal railway system has two grades of inspectors, first and second. This grading is somewhat arbitrary, as it is based on the duties performed and not on the percentage obtained in examination. Road or line inspectors constitute the first grade and starters and receivers the second grade. Dispatchers are taken from the ranks of the road inspectors.

RETIREMENT SYSTEM

The city of San Francisco has a retirement or pension system with death benefits for all city employees, and since April 1, 1922, the municipal railway employees have been included in this system. In fact, membership in this retiring fund is compulsory after six months of service for all municipal railway employees who receive salaries not to exceed $500 a month.

The amount of the payments made to the fund by the employees depends upon the age and salary earned, and an equal amount to the sum paid by the employee is contributed to the fund by the Municipal Railway. The cost to the municipal railway system for all employees, under the present wage scale, is approximately 9 cents per car-hour, made up of 6½ cents for the platform men and 2½ cents for other employees. Retirement is obligatory at the age of 70, but employees who have completed ten years of continuous service and have reached the age of 62, or those who have completed thirty years of service and have reached the age of 60, may retire any time after reaching these ages, if proper notice is given to the authorities.

The annuity received consists of the actuarial equivalent of the contributions made by the employee, plus those made by the municipal railway in his behalf, plus an additional pension, purchased by the contributions of the city and equal to 1⅓ per cent of his final compensation, multiplied by the number of his years of service, provided if he is 62 or more. If less than 62 and with thirty years' service, a slight modification of this method of calculating the pension is followed. Employees who withdraw from the service of the municipal system before becoming eligible to an annuity are entitled to their own accumulated contributions. There are also certain disability and death benefits.

The municipal railway has 1,070 employees, of whom 820 are platform men.

How Kentucky System Has Been Modernized*

Various Measures Taken in the Successful Elimination of Bus Competition by Means of Superior Service Are Summarized

THE developments that have been carried out in modernizing the plant and operation of the Kentucky Traction & Terminal Company, Lexington, Ky., have been covered step by step as they were accomplished in various issues of ELECTRIC RAILWAY JOURNAL. To bring these together in a summary, however, makes a story of accomplishment that is worth recording.

The Kentucky Traction & Terminal Company operates 70 miles of interurban lines and 21.5 miles of city lines in and around Lexington. It has completely reequipped its railroad system with a newly developed type of light-weight one-man double-truck passenger and freight cars, the former designed especially to give maximum comfort, speed and economy of operation. This complete replacement of rolling stock made it possible for the company to standardize on one type of motor and general equipment. The exchange of heavy equipment for light-weight cars has materially reduced the actual depreciation in the physical structures of track and roadway and has thereby reduced the future cash expenditures and prolonged the life of the investment.

For the public, the company has reduced all classes of transportation charges on the interurban system by 16⅔ per cent and has increased the service from a headway of one and one-half hours to a headway of one hour on all lines. It has given the public cars to ride in that it believes are as comfortable as a private automobile, and equal, if not superior, to any form of electric railway car now being operated. The public has responded with a generous measure of good will. The success of the company's modernization program, the attractiveness and comfort of the new cars and general progressive policy have made the company very popular.

The security holders have benefited because the management has converted the railway property from a situation where for the year prior to the conversion of the equipment an operating deficit existed into a property with an operating surplus over and above all charges. The property has thus been made self-supporting and the investment placed on a sound earning basis and one which the company believes can safely be maintained in the future against any form of competition.

From the standpoint of the car operator, the company's complete one-man operation has placed additional responsibility on the operator for which he is being paid a higher compensation. The company feels that it is making a better man out of him for himself and for the company as he is given a superior position.

The company has kept the public informed through consistent advertising, stating its activities and position in frank and definite manner. A recent advertisement stated the company's position as follows:

"During the past ten years it has always been our aim to keep abreast of advancing conditions and so to align our services that we may at all times be able to provide you with facilities commensurate with the population of those communities we serve. We shall continue to serve you to the best of our ability at rates equitable with the character and quality of good service rendered, and in line with principles of efficient business administration."

To carry out its construction program involving an expenditure of $375,000, which was a heavy commitment for this company in the face of a deficit from operation and organized bus competition, required courage, vision and conviction on the part of the company and its board of directors that the industry is permanent and can be placed on a sound earning basis if properly developed along lines that make the service of more than ordinary value to the public.

Some of the operating results accomplished are a reduction of 63 per cent in late trains, expressed in hours; a reduction of 41 per cent in the ton-miles of cars operated, despite the increase in service; a reduction of 18 per cent in the kilowatt-hours of energy consumed, although there was an increase of 8.4 per cent in cars operated. Revenue per car-mile has decreased from 45.6 cents to 37.1 cents, but operating expenses have also been reduced from 35.4 cents to 22.3 cents. The energy consumption per car-mile is now 2.92 kilowatts, as compared with 4.93 formerly.

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*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

Association News & Discussions

One-Man Car Experience*

One-Man Operation Has Shown Considerable Economies on Beaver Valley Line—Favors Double-Truck Car to Birney Type—Troubles Experienced and Changes Made and Results Obtained Are Detailed

BY W. H. BOYCE,
General Manager Beaver Valley Traction Company,
New Brighton, Pa.

SO MUCH has been said and is known of the one-man car being a life-saver for the smaller properties that today it becomes a question not of whether a company can get along without switching from two-man to one-man operation, but whether or not it is not mismanagement for a company to operate two-man cars when one-man cars would fill all of the requirements.

Aside from the operating problems entailed by reason of cars of certain routes operating into congested portions of a comparatively few cities, and in the full knowledge that there are other conditions such as several dangerous railroad crossings on comparatively short routes, and kindred problems, yet in my opinion there is no reason why more or less one-man cars cannot or should not be operated on most all properties throughout the country.

Of course there are one-man cars, and then again there are one-man cars.

There is no doubt that the single-truck, slat-seated, one-man car will receive a black eye in any community where an attempt is made to substitute it for comfortable, good-appearing, double-truck cars, particularly if track conditions are not good. But a rebuilt double-truck car or a new double-truck car properly heated and fitted with upholstered, properly spaced seats, mounted on smoothly riding trucks, can in most, if not all, cases be made to supplant the existing two-man service, at the same time rendering a better, more economical service.

I have not visited every one-man property in the country, nor have I sent out questionnaires to the companies operating one-man cars; therefore, I feel that I should confine this paper to our experience with the one-man car on the property of the Beaver Valley Traction Company and the Pittsburgh & Beaver Street Railway Company.

It might be well to explain that our system is split up into 2-mile zones, that we have a base fare of 5 cents for each zone, and that one route has as many as seven zones. Cars that are operated through more than two zones are equipped with Shanklin zone fare machines, with the aid of which the operator issues a receipt to the passenger when he boards the car and deposits his fare in the locked fare box. The passenger retains this receipt until he reaches his destination, surrendering it to the operator as he leaves the car. In addition to operating the car, issuing and accepting zone checks as above described, the operator makes change, sells several kinds of weekly passes, issues transfers, and when we have our bargain sale of tickets twice annually he sells twenty-four tickets for $1.

With the exception of six two-man cars that are being used for tripper service only and which on account of their age and condition we do not deem it economy to rebuild, we are operating 100 per cent one-man cars. Of these, twenty are standard Birney safety cars, manufactured by the Osgood Bradley Car Company, ten of which were put into service in September, 1920, and the other ten were put into service on Aug. 5, 1921. Six of our one-man cars are 36,000-lb. Brill semi-convertible cars, which we have rebuilt for one-man operation and on which all safety features were installed. These cars were equipped with new spring-cushion, cane-upholstered seats; the motor frames, trucks and car bodies were thoroughly overhauled, and the bodies painted inside and out, the exterior having been changed from a dark red to a taxicab yellow. We also have six new double-truck, one-man, two-man cars which are just being put into service.

I wish to call to your attention the fact that these six new cars are equipped with a storage-battery emergency lighting system; aluminum stanchions; Golden Glow 94-watt headlights; Holophane shades; double air-operated doors; four air sanders; electrolytic lightning arresters mounted in cab; and the car bodies are mounted on Standard C.P.-35 trucks, which is the easiest riding truck that we have ever had on our property.

Although in some few cases our headway between cars was decreased with the installation of the one-man car, our hauling is so comparatively light through the day and after the rush hour in the evening that for the ordinary business offered the single-truck car provides sufficient capacity, and as a consequence in most all cases our two-man cars have been replaced with one-man cars, adequate tripper service being furnished to take care of the morning and evening rush-hour periods.

It is not very often that a street railway manager admits that he has made a mistake, but I will say to you very frankly that we made a serious mistake when we purchased twenty safety cars. On some of our lines we have an interval of twenty minutes between cars through the non-heavy hauling hours, during most of which time the single-truck car has sufficient capacity to handle the ordinary business offered, but if one of them happens along at the finish of a football or basketball game, a concert, a dance, a lodge meeting, at the time of a train or interurban connection, or what-not, there is ofttimes not sufficient capacity properly to accommodate the passengers presenting themselves for transportation.

These things do occasionally happen, regardless of the fact that we have tried our best to get the officers of lodges and management of theaters, etc., to advise us of any unusual number of people that gather in their places of business or amusement, so that we may furnish adequate car service to take care of them.

We have not found it necessary to slow down our schedules by reason of the adoption of the one-man car, but, as will be explained later, we have made some improvements that are partly responsible for this. There is and has been for a number of years a slow portion of the schedule which starts at 3:21 in the afternoon and continues until 8 o'clock at night to take care of the rush-hour load. The slowest that any of our cars are operated on this schedule is 9 m.p.h., and during the off-peak hours the rate is 12 m.p.h., with no lay-over on our heaviest hauling lines.

On the two-zone routes, the passenger pays-enter in the first zone and pays-leave in the second zone. This works out very satisfactorily.

We have had but little trouble in concluding a suitable agreement with the Amalgamated Association regarding the operation of these cars. We know that the majority of our car operators would rather operate one-man cars at 5 cents per hour increase in their wage than operate two-man cars. Last year at agreement time, anticipating that we were going to a 100 per cent one-man operation, in addition to providing for paying one-man car operators 5 cents per hour in excess of the rate for two-man car operators, we gave the officials of the association a letter stating that so long as it became necessary for us to maintain crossing flagmen at certain points, we would put on these flagmen jobs trainmen who on account of age or other disability were not competent to operate one-man cars, and pay them at the former year's rate of pay, which is 7 cents less than the present two-man car rate, and of course 12 cents less than the present one-man car rate.

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*Abstract of paper presented before Pennsylvania Street Railway Association at Harrisburg, Pa., Dec. 4, 1923.

We had no difficulty with the councils or officials in the thirteen boroughs through which we operate when we installed the one-man car.

To make the operation of these cars easy and speedy for the trainmen, we have installed Nachod automatic block signals and electric track switches at all points where either can be used. To further aid the trainmen in making their schedule, we have installed at our heavy transfer points (where cars of three routes connect every ten minutes) an automatic signal system by means of which the operator of a car upon arriving at the transfer point knows that there is or is not a car of the connecting line within one-half mile of the transfer point. This has resulted in a considerable saving of time. Prior to the installation of these signals we had a rule requiring the operator of a car to wait at the transfer point for three minutes. If the approaching car was not in sight (the distance at which it became visible in either direction being about two squares), the operator was then permitted to proceed. Under the present arrangement, if after the operator has waited one and one-half minutes the block does not indicate that his connecting car is approaching he may proceed.

REDUCTIONS IN OPERATING EXPENSES

Today we carry on our list sixty-five trainmen, thirty-nine of whom are scheduled for the operation of regular runs, and twenty-one for trippers. Four years ago we carried on our list 110 men, eighty-nine of whom were scheduled for regular runs, and ten for trippers; while twelve years ago we were compelled to carry on our list ninety-eight men, eighty-eight of whom were scheduled on regular runs. Today our receipts are running in the neighborhood of $630,455 per year; four years ago they were $599,559 per year, and twelve years ago they were $341,066 per year. In other words, today our receipts are more than twice what they were twelve years ago, and we employ thirty-three less trainmen, trippers and regular runs both being considered.

We do not believe it necessary to go into detail on the man-hours and car-hours, except to say that for the first ten months of this year, had we been operating two-man instead of 100 per cent one-man cars, our trainmen's wages on the present wage rate would have shown an increase of $85,000, and at that rate we would soon be in the hands of the sheriff.

As regards our car mileage and power costs, for the year prior to the installation of the one-man cars, 1919, our total car mileage was 1,522,752, while the power cost was $91,332. In September, 1920, we added ten one-man cars, and the total car mileage in 1920 was 1,544,335, and the power cost for that year was $78,910.19. In August, 1921 we added ten additional one-man cars, and our car mileage for that year was 1,691,383, the power cost for that year being $86,811. For the year 1922 the total car mileage was 1,677,457, and the power cost for that year was $69,798. For the first ten months of 1923 our total car mileage was 1,447,062, and the power cost was $59,321, for the Beaver Valley Traction Company and the Pittsburgh & Beaver Street Railway, which was $8,012 less than power for the corresponding ten months of the previous year. This is due to the fact that for the past several months we have been operating some of our eighteen-hour per day runs with one-man cars, while two-man cars were operated on them last year.

NATURE OF MECHANICAL TROUBLES EXPERIENCED

The mechanical troubles we have had with the single-truck one-man cars are as follows: The body pedestal springs have broken and we have been compelled to increase the size of the journal spring from ¾ in. to ⅞ in. and the body springs from ⅝ to ¾ in. Any further increase would make a rougher riding car. One broken truck frame near the yoke is the extent of our truck trouble. We have had difficulty with air line to braking cylinder cracking, due to movement or breathing of cylinder. On each car two to four main cross-members of the underframing have broken. We have increased the size of these I-beams from 5½ to 7½ lb. and we believe this will correct that trouble. All these troubles are due to overloading. Based upon our experience, we would recommend that the weight of the standard single-truck car be increased slightly, at least enough to take care of the strengthening of the I-beams and underframing. We would also recommend the use of a 16-ft. air compressor, two fare boxes for short fast-schedule runs, the installation of motormen's stools on converted cars, and in order to keep tobacco juice off the steps we would recommend the equipping of all cars with trapdoor cuspidor flush with floor, headlights of greater efficiency than those with which these cars are generally equipped, and proper curtain device to shut off the glare of the car lights from the operator's windows.

CHANGES MADE

We removed the folding seats near the doors because passengers insisted upon sitting by the operator and blocking the doorway. To give much needed aisle space at the entrance we have changed the first seat inside the door from a cross to a longitudinal seat. The sand boxes were all moved forward one seat (28½ in.) to get away from wheel wash, which change has eliminated the trouble caused by sand pipe clogging.

We have had no trouble with the operation of these cars through snow except with the fender tripping device. During at least one snow storm it became necessary to tie up all fenders on account of the snow. We are now about to place hand straps in all our standard Birney cars.

On our converted cars we took out the Peter Smith heaters and put in 12,000-watt electric heaters in addition to a 1,000-watt heater placed in each cab; the heaters in the interior of the car are controlled by thermostats.

Based upon our experience, we believe that provided the weight of the double-truck car is not too great and that the body and trucks have not outlived their period of usefulness, it is far better for the comfort and convenience of the passenger to convert a good double-truck car to a one-man car than it is to purchase single-truck one-man cars. The total cost for converting our double-truck cars (which included new seats, electric heaters, all the Birney safety features, general overhauling, and painting) was $1,915 per car.

We find that most of the floors on the ten cars put into service in 1920 will have to be renewed during the year 1924. These are single floor cars.

In conclusion, we do not believe that the operator of a one-man car is overworked due to the performance of the functions of both motorman and conductor, but of course there is an increase in mental functions which should promote efficiency of the operator as regards safety and otherwise, for an idle man is an unsafe man.

We believe that in communities under, say, 75,000, the one-man car is the one thing that will help most to save the street railway facilities to the community served. In communities over 75,000 as a general proposition each one-man car substituted for a two-man car will add just that much to the welfare of the car rider and the employees in general and be indicative of good management. The saving effected might be applied to improvement of the conditions of track, overhead line, car equipment, or a wage increase or even a dividend.

We believe that if the cars are of the double-truck type, equipped with properly spaced upholstered seats, and if other consideration is given to the comfort of the passenger, and if the company's public relations are in good order, and if the trainmen and councils are properly sold on the idea of one-man operation and acquainted with the necessity thereof, there will be little if any complaint in any community where this operation is tried.

Auto Buses and Street Railways*

Legal Status in Pennsylvania Defined—Policy of the Commission Is Toward Supplementary Rather than Competitive Service

BY J. F. SHRADER
Attorney American Electric Power Company

THE public utility laws of the several states vary so much in their phraseology, scope and purpose that the conclusions reached in one state are apt to have, from a legal aspect, little weight as authority in another state. For example, in a number of states, including Illinois, the very important competitive service to the street railway of the taxicab has been held to lie outside the regulatory powers delegated to their commissions. In Pennsylvania, as is well known, certificates of public convenience are required for call and demand automobile service, and our commission has placed restrictions upon such service under certain circumstances effectively eliminating competition with existing facilities.[1] This discussion will be confined to the policies and conclusions arrived at under existing laws of the Commonwealth of Pennsylvania.

Strictly speaking, every transportation facility which is capable of depriving a carrier of a fare is in competition with that carrier. Such competition extends conceivably from the roller skate to the airplane and includes the bicycle, the horse-drawn vehicle and privately owned and privately operated automobiles, as well as jitneys, taxicabs and motor buses. Transportation which is purely private, although competitive, cannot be governmentally restricted or controlled in the interests of rail carriers in the furtherance of public convenience and necessity. Chairman Ainey of our commission as early as 1916 announced, with possibly a word of warning, the principle which must control the commission, using this language:

> . . . losses which this or other railway companies may sustain cannot be weighed against the convenience of the public if at any time a better or more convenient form of transportation than that furnished by the street railway companies is offered.[2]

Thus the acceptability of the service to the riders, or a considerable number of them, is in the last analysis the governing factor and will eventually control the extent to which the existing carriers will be subject to competition, private and public. In the measure that the street railways may be able to influence this decision by superiority, convenience, completeness and cheapness of service, they will accomplish more toward elimination of competition than the government could possibly accomplish, because the railways can, while the government cannot, reach and affect strictly private transportation facilities.

The Public Service Commission of Pennsylvania has adopted a non-competitive policy which has been judicially approved. This, of course, only extends to the carriers within the jurisdiction of the commission. Broadly speaking, these are common carriers for profit as distinguished from purely private carriers who may operate either gratuitously or for profit. In order to understand to what extent this protective policy of the commission may be anticipated, it is necessary to know exactly where the commission and the courts have drawn the line between common carriers and private carriers. It will also enable those contemplating inauguration of auto bus service in conjunction with rail service to determine to what extent they may expect competition with the proposed bus service.

COMMON CARRIER DEFINED

The public service company law[3] defines the relevant terms thus:

> The term "Public Service Company" when used in this act includes all . . . street railway corporations . . . common carriers . . . and also all persons engaged for profit in the same kind of business.
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> The term "common carrier" as used in this act includes any and all common carriers, whether corporations or persons, engaged for profit in the conveyance of passengers or property, or both, between points within this Commonwealth. . .

Our commission has held that the word "common carrier" as used in this law is used in its broad sense as comprehending all that comes under the common law definition, and is not restricted to such carriers only as are named in the statute.[4] The question as to whether a given service falls within or outside the classification of a common carrier is a question of fact for the commission in the first instance.[5]

The Supreme Court of Pennsylvania in 1909, prior to the adoption of the public service company law, defined a common carrier thus:

> Any one who holds himself out to the public as ready to undertake for hire or reward the transportation of goods from place to place, and so invites custom of the public, is, in the estimation of the law, a common carrier.[6]

A common carrier has also been briefly defined as "one who undertakes for hire to carry all persons indifferently who apply for passage." Whether a person is engaged in the business of a common carrier is not dependent upon the means employed for the carriage, fixed termini nor definite route. These are held to be but limitations which the carrier places upon himself beyond which he may not be compelled to go in the performance of the public service which he purposes to render.[7]

In approaching the question as to whether a particular service is or is not that of a common carrier, it has been held that it is immaterial what a man professes to do, or what he says he does not do, or what his charter authorizes him to do, but, rather, what does he do in fact.[8] He actually does at least two things; he holds himself out to the public as ready and willing to perform a transportation service, and he actually carries some one somewhere. Judicial decisions fix the former of these acts as the most important in determining the common carrier status. If he holds himself out as ready and willing to carry people indiscriminately as they apply, for hire, within the scope of his undertaking, either as to destination, numbers, route or method he has classified himself as a common carrier. After that he may actually confine his carriage, either voluntarily or by virtue of the exigencies of the situation, to particular classes of the public, such as employees of a particular industry, without affecting his status as a common carrier.[9]

This holding out or invitation of the patronage of the public may be done by public advertisement, signs upon vehicles, signs upon fences, cards for general circulation, or bills and tags used in the business.[10] It may be done by taking a stand in a public street or square and inviting the patronage of the public, either by sign upon the vehicles or by gesticulating to people as they pass by.[11] On the other hand, the keeper of a garage, who at his place of business hires motor cars upon individual bargains to those who come to him and apply, is not holding himself out indiscriminately in such a manner as to make him a common carrier.[12]

The law states that the carriage must be engaged in "for profit." "For profit" has been judicially construed as synonymous with "for reward" or "for hire." This excludes the case of all purely gratuitous carriage, or the case where the public is expressly excluded in the undertaking as well as in the fact of carriage. Thus it has been held that where a man confined his holding out and his actual service to five named persons, although he hauled them repeatedly and for hire, he was not a common carrier.[13] Likewise, upon this principle, I assume a vehicle jointly owned by a number of individuals and operated expressly and exclusively for the benefit of the owners, not for profit, and from which the public is actually excluded, would be held not to be a common carrier. The commission and the courts may be depended upon to discover and control any competitive service which, while in fact that of a common carrier, is conducted in a manner calculated to make it appear like that of a private carrier.

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*Abstract of paper presented at the annual convention of the Pennsylvania Street Railway Association, Harrisburg, Pa., Dec. 4, 1923.

[1] In re John Beville, P. U. R. 1923 C, page 294.

[2] Allegheny Valley Street Railway vs. Greco, P. U. R. 1917 A, page 723.

[3] Act of July 26, 1913, Pamphlet Laws, page 1374.

[4] Scranton Railway vs. Walsh, P. U. R. 1916 D, page 18.

[5] Allegheny V. R. Co. vs. Greco, P. U. R. 1917 A, page 723.

[6] Lloyd vs. Transfer Co., 223 Pa., 148.

[7] Railway Co. vs. Greco, *supra*.

[8] Taxicab Co. vs. Kutz, 241 U. S., 252.

[9] Howard vs. Public Service Commission, 77 Superior, 188.

[10] Lloyd vs. Haugh, *supra*.

[11] Railway Co. vs. Greco, *supra*.

[12] Piercely vs. P. S. C., 73 Superior, at page 214 (1919); Oppenheimer vs. Md. Casualty Co., 70 Superior, 382; Terminal Cab Co. vs. Dist. of C., 241 U. S., 252.

[13] Towers vs. Wildason (Md.), 109 Atl., 471.

An attempt was made in this state by a carrier to evade classification as a common carrier by limiting his passengers to current members of a "Community Auto Club." The qualification for membership in this club was the payment of $1, upon the payment of which the members received seven tickets as a gift, each of which was good for one ride. After these seven tickets were used the members could continue to ride by the payment of 15 cents cash fare or the purchase of additional tickets at the rate of seven for $1. This carrier contended he was not subject to the jurisdiction of the Public Service Commission upon the ground that all his passengers were carried under a special arrangement upon individual bargain. The commission found this special arrangement to be in the nature of a subterfuge, designated the service as that of a common carrier and issued a cease and desist order.[14]

It would seem that the practice of an automobile operator of rendering a service of carriage without exacting or demanding any particular fare but depending upon such reward as the passengers may see fit to give him, and where he holds himself out as ready and willing to carry all who apply for transportation, should likewise be held to be a mere subterfuge and effort to make an undertaking actually engaged in for hire or for profit or reward appear to be a gratuitous service.

CONVENIENCE AND NECESSITY DEFINED

The convenience and necessity of automobile carriage supplemental to the service of established rail carriers has, however, been repeatedly recognized by the Public Service Commission in this state and certificates for such service granted. We have endeavored to point out that above and beyond all power of the commission, although disposed to do so within proper limits, to restrict or control or direct the course of development of public carriage, there is the final factor of public demand which must prevail. This demand, sufficiently asserted, becomes a public necessity. It is not what the Legislature or the commission or the street railways or any individual thinks should be adequately sufficient service, but rather what a sufficient number of individuals in the community want and are willing to pay enough for to make operation possible that will finally determine the manner by and extent to which existing service facilities must be supplemented or extended. There is in every community in normal times a drift or trend of development and a shifting of population to new locations. Every new settlement must have its beginning and normally its growth is extended over a considerable period of time. There must be a period of time before it reaches a size which would warrant rail extensions when the residents, so far as the rail service is concerned, are actually inconvenienced in some degree in their transportation. The public demands supplemental service and in its present frame of mind finds auto-bus transportation satisfactory and convenient.

SUPPLEMENTARY OR COMPETITIVE SERVICE

The question arises whether the public convenience and necessity may be better served by permitting such supplemental service to be conducted by independent carriers or by carriers in some manner controlled by the street railway companies. The Public Utilities Commission of the District of Columbia in discussing this question has said:

> In our opinion, there is a legitimate field for bus service, but this does not lie in the multiplication of lines or of vehicles reaching the heart of the city. It lies rather in providing service in extension of the street car lines into territory so thinly settled as not to justify the large investment necessary for street railway service. The bus lines should be feeders. They should create business and not rob the street railways of the just reward due their heavy investments for the public benefit. An exception to this principle arises when the existing street railway service proves to be inadquate and, for reasons either physical or financial, additional street railway lines cannot be created. In such cases, even in thickly settled territory, the obvious recourse is to bus lines; but, in the absence of legal objections, the best interests of the public will be promoted by causing such lines to be owned and operated by the street railway companies and to co-ordinate them with the car lines so that transfer privileges and other desirable joint relations may result.[15]

The Pennsylvania Commission, in approving the application for incorporation of an auto bus company organized by an electric railway company and in issuing a certificate of public convenience for operation of such auto bus service in a field where at least forty-five jitney operators were operating under certificates, said:

> At best, and under the most exacting conditions of regulations, jitney service of the character of that rendered in Chester is transitory and unstable. Automobiles are usually employed which are not equipped as they should be for public conveyance; it is difficult to the point of impossibility to operate them with the regularity and safety or with the service efficiency of vehicles designed and constructed especially for public passenger service, and in many respects that are obvious passenger auto bus vehicles, properly equipped, are preferable and superior to the types of cars used as jitneys over city streets and public highways. The elements of greater responsibility for the rendition of adequate public service by an incorporated company, and of the permanence of such service, are also important factors.

And further:

> Such extensions as may be necessary adequately to provide for the requirements of the city and adjoining territory will have to be assumed by the operating company as part of its public obligation. Properly rendered, auto bus service as an addition and supplement to existing trolley facilities, and operating in conjunction therewith, should afford more adequate and reliable transportation facilities than the city of Chester has heretofore possessed.[16]

Subsequently the approval of the incorporation and beginning of the exercise of the right to operate auto buses in the same territory was sought by an independent applicant. The bus company, incorporated by the traction company, had not yet obtained the necessary license from the municipality, while the new applicant had such license. The Public Service Commission refused to approve the incorporation of the new company and stated:

> The commission is still of the opinion that the contemplated auto-bus service can best be rendered as a supplement to the existing trolley service, and can best be operated in conjunction with the trolley system.[17]

Our commission seems therefore to have adopted a policy favoring the operation of automobile service supplemental to trolley service by companies identified with the street railway companies. In addition to the likelihood that such operation will better serve the convenience and necessity of the public, from the viewpoint of the street railways themselves, distinct advantages would seem to result therefrom. Among other advantages which may suggest themselves to practical street railway men I would suggest the following:

1. It prevents outsiders from acquiring prior rights in territory naturally to be served by the street railway company. It is possible that such prior rights may at some future time arise to embarrass or impede the street railway company, either in the extension of its street railway lines or in the inauguration of supplemental motor bus service. The superiority of the motor bus over the transitory and unstable jitney is recognized, and this means that the motor bus will in all likelihood generally supplant the jitney. The motor bus involves a larger initial investment and will therefore in all likelihood be identified with more responsible and dependable owners. Such owners may not be so readily eliminated from the field by the buses controlled by the street railway companies.

2. Motor bus service so conducted identifies itself with the street railway service, as a part of it, and thus is a traffic feeder for the trolley cars at the same time that it tends to create a complete, satisfactory and acceptable transportation service, all of which, as has been previously pointed out, contributes fundamentally to the permanence and value of street railway investment.

3. It is well known that, despite the diligence of established carriers and of the Public Service Commission, irresponsible automobile operators do as a matter of fact, to some extent at least, compete with the rail carriers, either by failure to obtain certificates of convenience or by persistently exceeding the rights granted them. Such competition would be eliminated by motor buses operated in connection with the street railways.

4. It would prevent the diversion of traffic from the rail carriers, naturally and geographically entitled to it, to other carriers.

5. It would furnish a more responsible and substantial and unified automobile service.

6. It may at some future time enable street railway companies by the exten-

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[14] Lehigh Valley Transit Co. vs. Bauder, P. U. R. 1921 D, 404.

[15] In re Washington Rapid Transit Co., P. U. R. 1923 B, page 328.

[16] In re Southern Pennsylvania Bus Company, Application Docket, Pa., No. 6720, 1922.

[17] In re Chester Auto Bus Line, P. U. R. 1923 E, page 384.

sion of the auto-bus service to abandon unprofitable branches or lines without objection upon the part of any one.

7. It will insure the fixing of automobile transportation rates upon a scientific basis and to this extent eliminate an unfair and unfavorable comparison of rates as between motor bus and street railway carriers.

The increasing demand upon the part of the riding public for automobile transportation cannot, in my judgment, be safely ignored by the street railway companies, and it may possibly be that the motive of self-preservation may eventually force all street railway companies into greatly enlarged supplemental auto-bus transportation.

Accounting for Operating Expense and Depreciation

This Topic Considered in Report of Committee on Public Utility Rates at This Week's Convention of Railway and Utility Commissioners—Separate Fund Recommended for Depreciation Reserve

IN ITS report at the convention of the National Association of Railway & Utility Commissioners at Miami this week the committee on public utility rates said that previous reports of this committee have dealt with the fundamentals of rate making, such as valuation, depreciation and rate of return, and, as was pointed out in the report of the 1921 committee, valuation has received so much publicity that there has arisen the quite common view that valuation is an end in itself. The report at the Miami convention this week was given up largely to the subject of desirable regulations for the expenditure of a depreciation reserve fund, with some introductory references to the importance of accurate accounting of operating expense, to which attention had been called in the 1921 report. Thus, the report says that donations to educational and charitable institutions are not a proper charge for operating expenses. To allow them would be to make the ratepayer the real donor. In Alabama a federal judge, in a recent case, had allowed as an operating expense a contribution of $500 by the utility to the campaign fund of a candidate for the City Commission where the utility is located. An appeal on this has been taken by the state commission.

While the committee considers legitimate advertising as unquestionably a proper item to be allowed as an operating expense, it points out that utility advertising managers are not infallible and are liable to error especially if no questions are asked and their mistakes are passed on to the rate payer. If regulation is to take the place of competition for public service corporations, then regulation, while not infringing upon management, must know that management is honest, efficient and economical.

RESERVE FOR DEPRECIATION

This section of the report was written by E. R. Hughes of the Oklahoma Public Service Commission. An abstract follows:

Much has been said and written within the past few years on the maintenance of what is commonly called "the reserve for depreciation." Some have taken the position that such a reserve is entirely unnecessary and therefore unjustified. Others, who have recognized the necessity for such a fund, have held that it may be used by the utility affected in such a way and for such purposes as the utility may see fit to put it. A number of the state commissions, including that in Oklahoma, have taken the position that any amount allowed for depreciation should be maintained as a separate fund and strictly accounted for, in so far as its use is concerned.

It has long been recognized that some amount should be allowed for the gradual waste of property used and useful in the rendition of a public service. This principle was enunciated very clearly by the Supreme Court of the United States in the Knoxville water case, and it has been set forth in numerous textbooks on the subject. The necessity for the creation of such fund and the allowance in the fixing of a rate of an amount sufficient to take care of the gradual wasting away of the property used in the public service being conceded, the most important consideration then is: How shall the fund so created be treated by the commission with respect to its maintenance and use?

It should go without saying, in the opinion of the writer, that when a public utility engages in the business of serving the public, it assumes a responsibility for keeping its means of service in such condition that the service will not be interrupted or impaired. Its property cannot be removed and established elsewhere so long as it is needed in the service being rendered, and it cannot be permitted to run down or get out of repair to a point where service is affected.

For the reason that it is not possible to meet the factor of depreciation from day to day or from year to year, the full serviceability of the utility's property can only be maintained where there is provision made against the time when retirement or replacement can be made. This provision must be financial in its nature and must be reasonably liquid so that its use when needed will not be unduly delayed. It must be reasonably adequate in amount, and should be, as has been repeatedly asserted by various state commissions, fully protected at all times. From the nature of the obligation which rests upon the utility, the provision of such a fund is as much a part of the utility's property as any physical unit in it, and when provision is made therefor it renders the immediate physical conditions of the property relatively unimportant for the reason that whatever may have gone from the physical property through use is represented in a ready financial ability to retire or replace when necessary.

It is true that the consumer pays only for the commodity which he has received in the way of service, but it must not be overlooked that under regulation under the ordinary and usual conditions the concern supplying the commodity is in fact a monopoly enjoying the exclusive privilege and right of engaging in the business undertaking, and under usual and ordinary conditions the consumer is entirely dependent upon one concern for the supply of that commodity which, in many instances, is practically a necessity. He therefore looks to the regulating authority to see that all reasonable measures are taken to insure in so far as possible a continuation of the supply of the commodity and the continued rendition of uninterrupted and unimpaired service.

THE OKLAHOMA ORDER

These considerations induced the Oklahoma commission in 1921 to conduct some hearings on the subject and in 1923 it issued an order based largely on that used by the Indiana Commission in several specific rate orders made by it. A summary of the material provisions of the Oklahoma order is as follows:

"1. That each and every public utility company operating within the State of Oklahoma shall, on and after Feb. 1, 1923, create, provide and maintain separately a depreciation reserve fund, into which shall be placed all the moneys allowed and earned for depreciation.

"2. No public utility company shall be permitted to pay out in dividends any sum in excess of 8 per cent of the record value of its property used and useful in rendering service until after the full amount of allowed depreciation shall be paid into the depreciation reserve fund of such company.

"3. That said fund shall be handled and accounted for entirely separate and apart from the other ordinary funds of such utilities.

"4. That such depreciation reserve shall be held strictly in said fund and shall only be used in the following way and for the following purposes, to wit:

"(a) For meeting depreciation.

"(b) For investment in government or other high grade listed securities to be held strictly in said fund, and which shall return to said fund not less than 4 per cent per annum, or

"(c) Any such utility may borrow from its depreciation reserve fund for a period not to exceed three years an amount equal to the cost of any new construction, extension or addition to the property—items chargeable to capital account—but as security to said fund there shall be deposited in same the utility's own bonds or the notes of such utility bearing interest at the rate of not less than 5 per cent per annum, which interest shall accrue to said fund.

"5. In handling such fund the utility will be held strictly accountable for its safe investment, for proper administration and accounting. Said accounting shall be double entry with the asset account designated 'depreciation fund' and the liability account designated 'depreciation reserve.'

"6. Each annual report filed by any public utility company shall set out clearly the exact conditions of said fund, showing clearly all additions to or deductions from this fund during the year covered by such report, the balance of said fund at the close of the year, and how invested."

The provisions of this order are not so drastic as many of the commissions of the United States have seen fit to adopt in connection with depreciation reserve requirements. It was sought to make the order sufficiently elastic and broad to cover all classes of public utilities, as well as to meet the different and varying conditions under which the different utilities were operated.

The great difficulty which confronts a regulating commission in this matter is usually the fact that after an allowance has been made, in the fixing of a rate for depreciation, in addition to the amount allowed at interest upon the investment, a great many utilities have taken the amount allowed as depreciation and capitalized it in property, to be used in connection with the service rendered, or have paid out the amount so earned in the way of dividends to the stockholders. The result of this practice is that when the time arrives when a continuance of public service depends upon replacement of property, used in the service, that such utility then applies to its commission for an additional rate based upon that necessity. The patron of the utility, having once paid into the coffers of the company, is again required to pay in the way of an advanced rate for that for which he has already paid once.

This question has been considered in numerous cases by commissions in the United States and the position of the Oklahoma Commission is in line with the decision of the Supreme Court in Railroad Commissioners vs. Cumberland Telephone & Telegraph Company, 212 U. S., 414, where the court, after saying that money collected for depreciation should not be so used as to add to the capital account, pointed out that this was not a case where there were surplus earnings after providing for depreciation fund, and the separate earnings were invested in extensions and additions. This distinction is a very important one to be remembered by the various commissions. In the Cumberland case also, the court declared that the burden of proof, after showing where the depreciation reserve fund was expended, rests upon the utility and not upon the commission.

In conclusion, the commissions of the country should closely scrutinize the operating conditions of the utilities regulated by them with a view to seeing that revenue paid into the treasury of the company for the purpose of guaranteeing continued rendition of service is not dissipated by the paying of exorbitant dividends and is not capitalized without a strict account of the fund raised by this method by the utility.

The full committee on public utility rates, rendering this report, was Frank D. Morgan, Alabama, chairman; E. R. Hughes, Oklahoma; A. A. Betts, Arizona; J. M. Thompson, Idaho; Henry C. Atwill, Massachusetts; William J. Smith, Illinois, and Porter Dunlap, Tennessee.

Utility Policies Discussed

Association of Railway and Utility Commissioners Consider Regulatory Measures at the Miami Convention

THIS week the National Association of Railway & Utilities Commissioners is holding its annual meeting in Miami, Fla., and an extended program of addresses and committee reports is under consideration. Those from whom addresses are scheduled include representatives of the American Electric Railway Association, National Electric Light Association, American Gas Association, American Railway Association and Interstate Commerce Commission. A few of the committee reports have been received in time for brief reference in this issue. One on public utility rates is printed in rather extended abstract in another column. Abstracts of some of the other reports follow:

The report of the committee on service of public utility companies was devoted largely to a consideration of the New Jersey situation of last summer, when there was no trolley service for fifty-one days in 142 municipalities, representing a total population of more than 1,000,000 inhabitants. According to the report, the situation which began with the strike of the employees became a strike against the public on the part of the company, which adopted a policy of "Agree to our plan or no service will be offered." Legal measures under which the company was required to begin service are described. The report, in defending the position of the court of equity of New Jersey in the case, cites the possible case of a water company which desired to increase its rates or relieve itself of other economic burdens and announced that it would withdraw all water service until the public officers and the public at large consented to its plans. But little imagination is needed, the report says, to point out the disaster to any large city if its water supply were cut off entirely for a period of fifty-one days. The report continues:

> The law should never be without a remedy under such conditions, and that remedy should be one that should immediately be effective and should not be surrounded by any of the ordinary delays incident to legal procedure. . . .
>
> The action of the company in New Jersey in withdrawing its service in its entirety was at once a challenge to the sovereignty of the state. Its success would have defeated all regulation. It would have nullified all laws and the supreme power of the state over its citizens and corporations. It would have pointed out to all utility companies that relief as to rates and to any other economic condition could be brought about by any company by simply withdrawing its entire service until its terms were met by the public. We express the doubt that nowhere since regulation became a part of our political institutions has any great public utility attempted to establish such a precedent.

In its recommendations the committee declares that in every state where regulation is effective steps should be taken and a proper legal machinery be proded to prevent a situation of this kind ever becoming effective, and that the franchise obligation to serve shall always be construed to mean continuous and uninterrupted service. The report was submitted by J. J. Divine, chairman of the West Virginia Commission.

GRADE CROSSINGS

The report of the committee on grade crossings and trespassing on railroads contains a table showing the apportionment of the cost of eliminating grade crossings in the different states, when fixed by statute. The report declares that the time has come when in some form the automobilist should specifically be required to share in the expense which has usually been divided between the railroad and the public. The proportion suggested is 40 per cent for the public, 40 per cent for the railroads and 20 per cent for the automobilist, and the suggestion is made that this 20 per cent might possibly be obtained by diverting the fines imposed upon automobilists for reckless driving into a fund for this purpose. The report, which was submitted by W. T. Gunnison, New Hampshire, chairman, also suggests that to compel automobilists to slow down at crossings obstructions might be placed in the highway.

Central Traffic Men Meet

AT A meeting of the Central Electric Traffic Association in Cleveland, on Nov. 21, the committee on prevention of freight claims recommended that all waybills covering inter-line shipments be placed in a large waybill envelope and carried outside the car rather than inside the car with the shipment.

The association also decided to advertise the lines of the Central Electric Railway Association territory in the *Traffic World*, the amount of space to be contracted for depending on the number of companies which are willing to participate in this advertising.

Pennsylvania Men Discuss Bus and One-Man Cars

TWO very practical papers, one on the use of motor buses by street railways, by J. F. Shrader, and the other on one-man car operation, by W. H. Boyce, were the features of the annual meeting of the Pennsylvania Street Railway Association held at Harrisburg, Pa., on Dec. 4. The convention was limited to an afternoon and evening session only, but the attendance was larger than usual, being about 100 altogether. In the absence of President C. B. Fairchild, the meeting was presided over by Vice-President F. R. Phillips, Pittsburgh Railways.

The electric railway men were greeted by Governor Pinchot, who said that he was glad to say that the street railways had recognized their duty to the public, which cannot be said of all other public utilities, as, for example, the anthracite industry.

The papers presented by Mr. Shrader and Mr. Boyce appear elsewhere in this issue. John P. Dohoney of the Pennsylvania Public Service Commission sent a brief communication to the convention on the subject of safety, in which he commented that in a period of ten years there had been only four street car passengers killed as a result of crossing collisions in Pennsylvania. He said that this marvelous record reflects the precaution that is exercised in crossing movements and is made more notable by the fact that trolleys are operated over 611 crossings, 310 of which are on main lines.

Major Otto Rau addressed the meeting briefly on "The Giant Power Survey." Major J. S. S. Richardson, director of the Pennsylvania Public Service Information Committee, presented a paper reviewing the history of the development of the state information committees and outlining the plan of their work and the accomplishments of the Pennsylvania committee in its brief existence.

The convention passed a resolution indorsing the tax reduction plan of Secretary Mellon. Further business was the decision to appoint a committee to investigate the possibility of legislation to permit railways to operate trackless vehicles under their present charters. The executive committee was authorized also to appoint a permanent committee to co-operate on the giant power survey.

The new officers elected for the ensuing year were as follows:

President, F. R. Phillips, acting general manager Pittsburgh Railways; vice-president, W. S. Bell, general manager Wilkes-Barre Railway; secretary and treasurer, H. M. Stine, Harrisburg, Pa. The executive committee will consist of Messrs. Phillips and Bell and Gordon Campbell, C. L. S. Tingley, Thomas Cooper, C. F. Crane, and C. B. Fairchild.

At the evening banquet short speeches were made by several people. Edward E. Beidleman, former Lieutenant-Governor of Pennsylvania, expressed the belief that the pioneer investor deserves a greater return on his money than the man who takes no chances, and that new capital cannot be secured for future pioneering enterprises if the return is too rigidly limited. In other words, he disapproved of the limitation of railway earnings to the so-called fair return of about 6 per cent.

Kentucky Utilities Meeting Postponed

THE annual meeting of the Kentucky Association of Public Utilities, scheduled for Dec. 13 and 14 has been postponed to Jan. 10 and 11, 1924, according to an announcement from Edward F. Kelly, secretary.

American Association News

Midyear Meeting Program

AT THE meeting of the committee on subjects and meetings of the American Association, held in New York on Nov. 27, it was decided to make the city traffic problem the topic for the morning session of the midyear meeting, which will be held in St. Louis, Mo., on March 4, at the Chase Hotel. Traffic will be discussed from various standpoints including those of municipal authorities, motor vehicle interests and electric railways, with the idea of co-ordinating all interests in working toward better conditions.

It was decided to devote the afternoon session to the subject of finance, with three principal speakers, one a banker, one an economist and the third a holding company representative.

There will be the usual banquet in the evening with a speaker of national prominence closely associated with the administration in Washington, and one other speaker, of public prominence.

The members of the subjects and meetings committee present were Chairman Frank R. Coates, Gen. George H. Harries, Harlow C. Clark, J. K. Punderford, F. W. Doolittle, W. H. Hyland, Cornell S. Hawley, Harry L. Brown, E. H. Reed, representing E. M. White, and J. W. Welsh.

Extra Mail Pay

THE Post Office Department in circular letter R-A-514, dated Nov. 28, issued by the division of railway adjustment, office of second assistant postmaster-general advises that the department will pay for emergency mail service duly employed on and after Dec. 1, 1923, as supplied by the urban and interurban electric railways. L. H. Palmer, chairman of the committee on mail pay, interprets this to be largely to take care of the Christmas business, although it would apply at any time of the year when for some exceptional reason excess mail moves.

Heavy Electric Traction

THE first meeting of the heavy electric traction committee of the Engineering Association was held at New York Dec. 6. It was voted to revise and bring up to date the bibliography of heavy traction and electrification data, rearranging it in such form as to be more readily accessible. It was proposed to limit the number of periodicals indexed to approximately twenty-five of the leading American and foreign journals. The subject was referred for further study to a sub-committee, of which H. F. Brown is chairman.

The subject of self-propelled cars and storage battery locomotives was discussed. It was felt that information on this topic would be of importance not only to the steam railroads, but also to a certain number of interurbans which might require extensions in territory where an electric line is not justified. It was the sense of the committee that the topic should include self-propelled locomotives as well as motor cars. The subject was referred to a sub-committee, J. H. Davis chairman.

The subject of articulated trains was referred to a sub-committee headed by J. J. Sinclair.

There was some discussion regarding the subject of couplers for train service. The entire matter, including the proposed manner of treatment, was referred to a sub-committee, with A. H. Daus as chairman.

Those present at the meeting were J. C. Davidson, chairman; A. H. Armstrong, A. H. Candee for H. W. Cope, H. F. Brown, J. H. Davis, E. P. Chase for J. V. B. Duer, Norman Litchfield, L. S. Wells, J. J. Sinclair, A. H. Daus and Morris Buck.

Special Reports Available

THE Bureau of Information and Service of the American Electric Railway Association announces that the following special reports have been prepared and are available to member companies in good standing upon request:

Trend of Material Prices: A new edition of the association's compilation bringing down to date the trend of prices of materials used by electric railways as furnished by manufacturers.

One-Man Car Operation: A summary of the replies of over 200 companies to the association's questionnaire, showing the number and types of one-man cars operated, fare collection methods, accident record and the attitude of the public toward operation with one man.

Accident Statistics of Electric Railways: Comparative record of 113 companies for the years 1920, 1921 and 1922, showing number and cost of accidents, causes of the more frequent types of accidents and comparisons on unit basis to show the general progress in accident prevention.

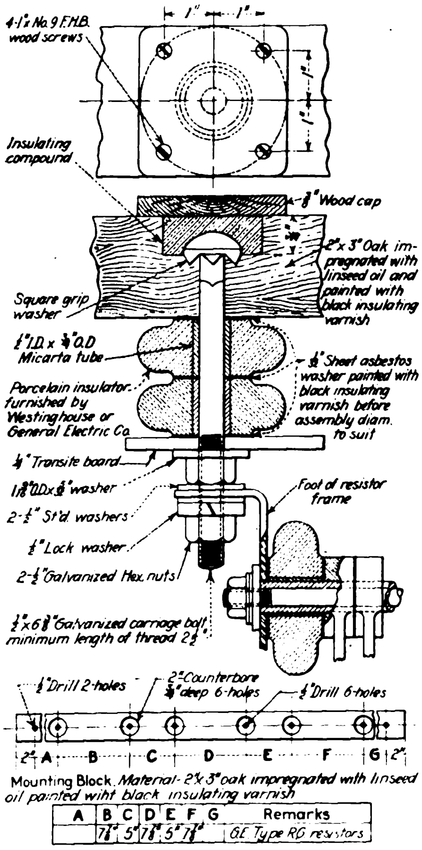
In addition to the above, supplements to the Wage Bulletin, Fare Bulletin and Cost of Living Studies have been prepared bringing them down to date.

Maintenance of Equipment

Improved Type of Resistor Mounting

By H. S. Williams
Assistant Superintendent of Equipment, Department of Street Railways, Detroit

LAST season so much trouble was experienced with comparatively new equipment on the lines of the Detroit Municipal Railway, due to grounded resistors, that radical steps had to be taken to correct the inherent weakness of the method employed in mounting. This original method was the familiar scheme using two porcelain insulators and insulating sleeves at each supporting bolt, which plan is recommended by the large manufacturing companies. This scheme has proved unsatisfactory in that the leakage distances are too small. Of course, this trouble could be minimized if all the porcelain insulators were kept clean. This however, is impracticable because of the added cost of such care and the fact that the upper porcelain is often very inaccessible.


1" 1"
4-1½" No. 9 F.H.B. wood screws
1"
1"
Insulating compound
⅛" Wood cap
2"x 3" Oak impregnated with linseed oil and painted with black insulating varnish
Square grip washer
½" I.D. x ¾" O.D Micarta tube
1/32" Sheet asbestos washer painted with black insulating varnish before assembly diam. to suit
Porcelain insulator furnished by Westinghouse or General Electric Co.
¼" Transite board
1⅜" O.D x 5/32" washer
2-½" St'd. washers
½" Lock washer
2-½" Galvanized Hex. nuts
Foot of resistor frame
½"x 6⅜" Galvanized carriage bolt, minimum length of thread 2½"
½" Drill 2-holes
2" Counterbore ⅜" deep 6-holes
½" Drill 6-holes
2" A B C D E F G 2"
Mounting Block. Material - 2"x 3" oak impregnated with linseed oil painted wiht black insulating varnish
A B C D E F G Remarks
7⅜" 5" 7⅜" 5" 7⅜" GE Type RG resistors

Sections and Plans of Method of Mounting Resistors

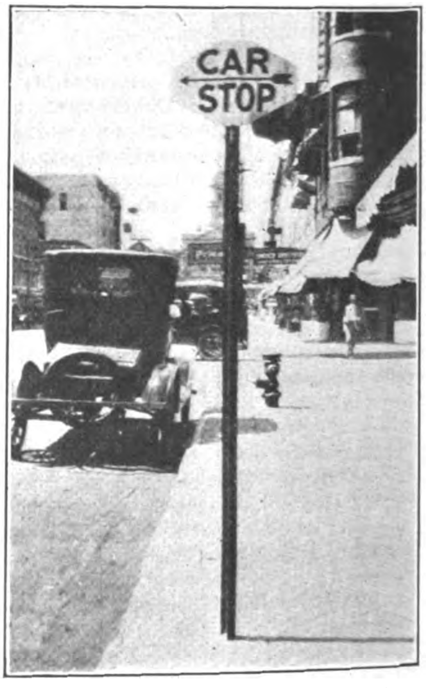
The accompanying illustration shows the improved plan of mountings which has been adopted. This is essentially a combination of the method used many years ago with the latest recommended practice, but with added refinements. The mounting block which fastens to the car underframe is made as long as convenient. This is of oak, and, after fitting and drilling, it is prepared after the principles used in dipping and baking railway armatures. It is baked in an oven, dipped in linseed oil or insulating varnish, baked again and given a final coat of black air-drying varnish. This gives it a lasting moisture-proof character.

The next step is the application of the grid mounting bolts. These are galvanized carriage bolts countersunk in the mounting blocks, and the countersink is filled with a special insulating compound so as to prevent any leakage at this point due to moisture. This compound is further guarded by an impregnated wood cap. Definitely to avoid trouble from the turning of the carriage bolt head in subsequent maintenance, a special square grip washer is used.

Insulating sleeves and porcelain insulators are then applied. With two porcelains used together the leakage distance is increased so that no matter how much alkali, dust and moisture is present they will stand up. The transite heat guard is then applied and bolted in place. Up to this point the installation is considered permanent, which explains the extra precautions used as to detail. It is believed that with this plan carefully followed, the slight added expense is fully warranted and that resistance grounding will be entirely overcome. All wires to the resistance have the insulation removed from the connectors back to the top side of the transite board and the bare wire is tinned thoroughly. The same porcelains used in mounting are being tried out at the ends of the resistance grids in order to increase leakage distance at this point. An opinion on its efficiency cannot be given yet.

Old Rail Used to Support Car Stop Sign*

DURING the recent war the Northern Texas Traction Company, Fort Worth, inaugurated the skip-stop system on its city lines. It was therefore necessary to designate each stop by a car-stop sign. For this purpose was used a metal plate fastened to a vertical post made of an old rail sunk into the sidewalk.



All Car Stops in Fort Worth Are Marked by Signs of This Type

On all lines on which front-entrance one-man cars were used these posts were placed at the curb in such a position that when the car came to a stop the car-stop sign would be exactly opposite the front door. Similarly, on lines where rear-entrance cars were used the posts were located further from the street corner, so that the sign would be opposite the rear-entrance door of the car.

Installation of these signs has resulted in speeding up the service and a lessening of confusion among the boarding and alighting passengers. When additional stops were installed new signs were erected at all of the new stopping points. Whenever double-truck two-man cars, with rear entrance, are replaced on any line by one-man front-entrance cars the car-stop signs are moved so that they will be in the proper position for the new type car.

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*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

New Cable Suspension Reduces Vibration

By G. H. McKelway
Engineer of Distribution Brooklyn-Manhattan Transit Corporation

A NEW form of suspension for high-tension triplex lead-covered cables has been worked out in Brooklyn to reduce the vibration where the cable is suspended from the elevated structure. In a number of places cable of this type is used where there is no underground conduit, and occasionally cables are run overhead on pole lines.

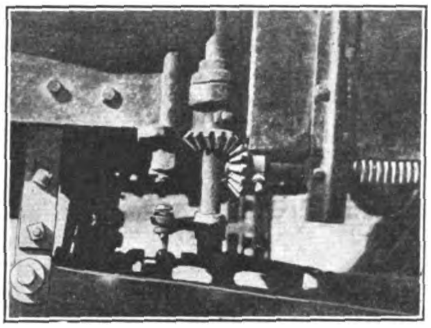
Originally the practice was to hang the cable directly from a messenger wire, which in turn was attached to the structure. The connection between the messenger wire and the cable was made by marline instead of by metal clips, since the elevated structure was used as a part of the return circuit. It was considered undesirable to permit any current to flow along the sheath of the cable, as this might cause damage by electrolysis. Some trouble was experienced due to cracking of the lead sheath, caused by vibration of the elevated structure whenever a train passed.

An improved method of construction was adopted to remedy the difficulty. A suspension wire is attached by U-clamps, which run through the flanges of light I-beams bolted to the girders. A second messenger wire is hung from this suspension wire by U-bolts attached at intervals of approximately 10 ft. The lead cable is suspended from the lower messenger by marline, the wrappings of marline being spaced 1 ft. apart.

Steady braces are provided on curves where there is danger of the cable being pulled against the elevated structure. These consist of pieces of strap iron bolted both to the girder and the lower messenger wire. This improved method of suspension has reduced the troubles from cracking of the lead sheaths considerably. Vibration is not entirely eliminated, but by careful inspection at frequent intervals cracks can be located and repairs made before moisture can enter to damage the insulation.

Bevel Gears Improve Door Operation*

THE Northern Texas Traction Company, Fort Worth, has found the use of bevel gears in place of toggles and rods for door and step operation to be a great improvement. These gears are installed on the lower end of the door rod, as shown in the accompanying illustration. Their use reduces the amount of door and step rigging by half and makes it possible to adjust the mechanism with a single movement. Door and step trouble has been greatly reduced, and the operation from a transportation standpoint is much more satisfactory than with the older type apparatus.



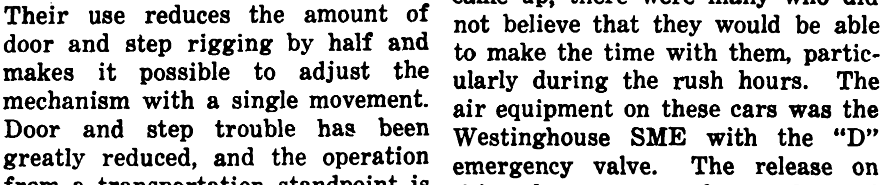
This Bevel Gear Arrangement Has Given Satisfaction on the Cars of the Northern Texas Traction Company

Long Wear Platform Flooring

THE Chicago Surface Lines recently made a careful investigation of the construction of platform floors on its cars for the purpose of reducing maintenance costs.

These floors have heretofore been made of single 13/16-in. hard maple boards, 3¼ in. wide. It was found that it often became necessary to renew flooring because of the splintering of the boards at the tongue and groove joint as the upper surface became worn. In many cases the floor still had ample strength but was replaced on account of its poor appearance.

The arrangement shown in the accompanying drawing has been adopted to increase the life of the flooring and also to avoid the unsightly appearance of open cracks. The tongue and groove are cut as near the lower surface as practicable, thus giving a wearing depth of ⅜ in. from the upper surface. The lower face of the tongue is cut almost at right angles to the edge of the board, while the upper face is sloped down at a sharp angle. Consequently when the flooring becomes worn down to the edge of the groove the resulting crack in the joint does not become unsightly until all of the useful life has been obtained.



Special Tongue and Groove Arrangement for Increasing Life of Flooring

Emergency Valve Used as a Quick Release Valve*

ONE of the principal advantages of the Birney car is its extremely rapid acceleration, and when a question of converting the large double-truck cars of the El Paso Electric Railway into one-man type came up, there were many who did not believe that they would be able to make the time with them, particularly during the rush hours. The air equipment on these cars was the Westinghouse SME with the "D" emergency valve. The release on this valve was very slow, and would not make for quick acceleration. The valve was studied with the idea of converting it into a quick-release type, with final success.

The emergency valve was left in its original place, the emergency line was removed and the emergency port leading to the bottom portion of the valve was plugged and the emergency valve taken out. The main reservoir line was left in its original position, the straight air line from the "D" emergency valve was connected to the brake cylinder line on the K-1 emergency valve.

By making this change, not only was the quick acceleration obtained, but also much quicker brake action, thus obtaining more rapid operation and better conservation of equipment.

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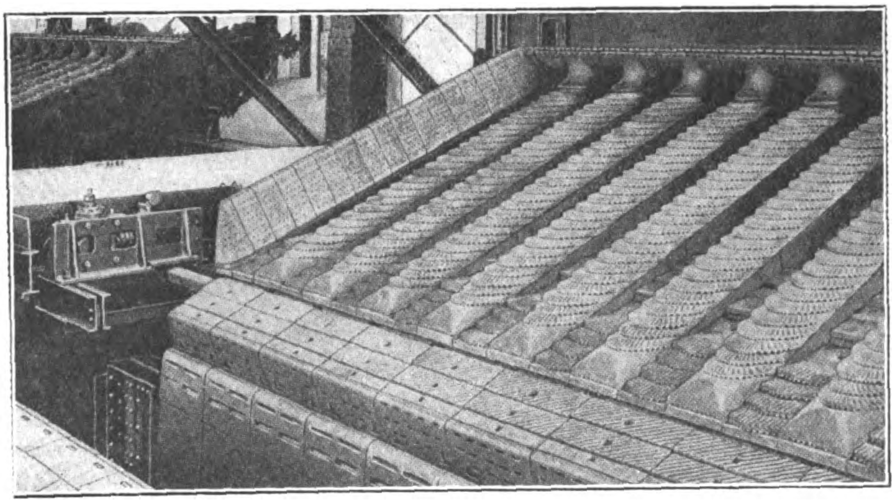
*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

New Equipment Available

New Model Underfeed Stoker

THE Westinghouse Electric & Manufacturing Company announces the development of a new multiple retort underfeed stoker. This is sold in all the usual sizes and includes double and single dump grates, also double and single roll ash discharge devices. A new development in positive control of the contour of the fuel bed has been added, also another new feature of this stoker is the agitating element. This provides a means of maintaining minimum loss due to combustible in the refuse. The experimental installation of this type of stoker in Minneapolis was treated at length in this paper, in the issue of Aug. 12, 1922, on page 221.



Interior View of Stoker Showing Ash Discharge Device

The movement of the secondary ram is counter to that of the main ram. The motion agitates the fuel beds as the rams approach and recede from each other, thus uniformly distributing the fuel. The secondary rams are actuated by connecting rods from the main ram. The travel of the individual or group of rams is varied in increments from no travel to full travel. The action of the agitating grate is provided by a steam or air cylinder controlled by a pilot valve mounted adjacent to the side furnace door.

The wind box is beneath the stoker and is exceptionally large. The dampers are rectangular and of large area, hence the air velocity through the damper frames is relatively low for any condition. The damper frames are steel and cast iron set in the concrete floor of the wind box. The main and division dampers are made of steel plates with angles. Each damper has its control conveniently mounted in front of the stoker.

The new ash discharge device or clinker grinder which has been developed can be applied to any Westinghouse underfeed stoker. The construction provides for four walls which are relatively vertical, assuring positive discharge of the refuse into the deep pit, where the large rolls dispose of it. The front and rear walls are built of heavy sectionized cast-iron plates of uniform thickness. This provides for expansion and contraction without cracking. The large square forged-steel shafts are incased in heavy sectionalized cast-iron rolls and are supported by massive bearings.

Roller Pipe Cutting Machine

THE Geist Manufacturing Company, Waynesboro, Pa., has placed upon the market a high-production heavy-duty roller pipe cutter. The design of this machine embodies features which have eliminated certain weaknesses found in other machines of this type.

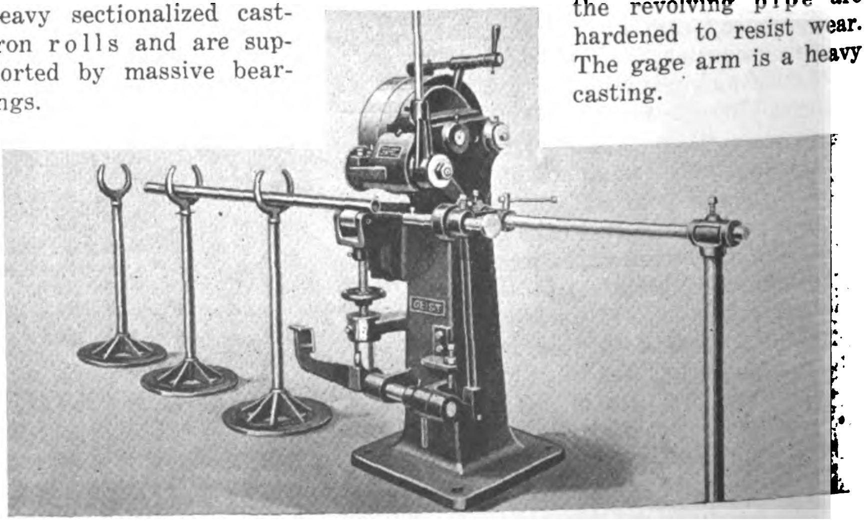
This machine is made in one size, having a range from ⅛ in. to 2 in. inclusive.

It is compact and rigid in design. All spindles and shafts are ground and run in bronze bushed bearings.

The cutter is made from tool steel and is heat-treated to give the maximum wearing qualities. It can be reground when dull. The cutter shaft bearing is provided with an adjustable cap on the cutter side for taking up any wear which may occur.

The rollers are made from tempered tool steel and are carried in roller bearings. The cage which supports the rollers is elevated to the cutter by a cam operated jointly by a pedal and a lever. The sliding surfaces of the cage are protected from scale and dirt by a flexible guard. The rollers are adjustable for the different sizes of pipe. This adjustment is obtained by means of a hand wheel located just below the rollers. The lever and the pedal can be positioned to suit the operator. Their movements are limited by an adjustable stop. A small cage of rollers for ⅛-in. to ⅜-in. pipe can be attached to the large cage without removing the regular rollers.

The length gage is adjustable for the different sizes and lengths of pipe. It will gage lengths of pipe up to and including 4 ft. The parts coming in contact with the revolving pipe are hardened to resist wear. The gage arm is a heavy casting.



Heavy Duty Pipe Cutting Machine

The News of the Industry

North Shore Rights Through Chicago Disputed

Corporation Counsel Believes High-Speed Interurban Has Exceeded Its Rights

An opinion was recently delivered to the City Council of Chicago by the corporation counsel holding that the Chicago, North Shore & Milwaukee Railroad is operating passenger, merchandise dispatch, express and freight service over the Northwestern and South Side "L" lines within the city limits without legal rights. This opinion is the result of an order passed by the City Council which declares that the North Shore Line is operating within the city without franchise and requires that it be compelled to stop its trains at all stations or get off the right-of-way of the "L" lines altogether. The city law department contends that the franchises of the two "L" lines do not give these companies the right to grant trackage rights to the North Shore Line.

HISTORY OF THE CASE

According to the legal department of the North Shore Line, this company operates over the "L" tracks under a statute of the State of Illinois which provides that one railway property may lease trackage rights over another railway property, even though such rights are obtained under protest. A city ordinance, however, does prevent certain steam road equipment from being operated over the elevated structure. This ordinance has not been violated by the North Shore Line because no attempt has been made to operate other than electric railway equipment.

In July, 1907, the City Council of Chicago passed an ordinance authorizing the Chicago, Milwaukee & St. Paul Railroad to electrify that part of its Evanston Division lying between Irving Park Boulevard and the city limits on the north. The ordinance provided that trains be operated electrically, either by the St. Paul company or by the Northwestern Elevated, but that in either case passengers should be carried from all stations within the city limits to all stations on the Union Loop without change of cars.

In 1910 the City Council passed an ordinance requiring the St. Paul company to elevate its tracks from Montrose Avenue to the north city limits, but no construction work was done then. Later the Chicago, North Shore & Milwaukee Railroad desired to get entrance over the elevated structure into the Chicago Loop. The St. Paul Railroad was willing to lease its right-of-way from Wilmette, a suburb just north of Chicago and Evanston, to Montrose Avenue to the North Shore Line, provided the Northwestern Elevated would surrender its contract made in 1907. The St. Paul company was ready also to elevate its entire right-of-way for additional tracks, provided the North Shore Line would undertake to handle electrically the freight business of the St. Paul Railroad along the lake shore in Chicago and pay interest on the capital expenditure for such track elevation.

The North Shore agreed to assume these obligations if the Northwestern Elevated would surrender its 1907 agreement and permit the operation of trains of the North Shore Line over its track to the Union Loop and over the lines of the South Side Elevated to Twelfth Street. A joint operating agreement was entered into which rendered inoperative the agreement of 1907. The lease from the St. Paul Railroad was made to the North Shore Line, which is financially responsible to the St. Paul for all obligations, the Northwestern Elevated guaranteeing the performance of such obligations.

In this agreement the Northwestern Elevated, as between it and the North Shore Line, assumes all the lessee's obligations and in return gets the lessee's share of the benefits accruing from the lease, the North Shore Line reserving certain specified track rights, for which it pays the Northwestern Elevated rental, based on car mileage. Without the additional security given by the North Shore Line, the St. Paul would not have elevated its full right-of-way, so as to provide four main tracks for express service to the city limits instead of two as required by the 1910 ordinance. The continuance of service by the Northwestern Elevated north of Wilson Avenue is thus claimed to be directly dependent upon the performance of its obligations under the agreement, including the obligation to let the North Shore Line use its tracks to the Union Loop.

This lease and operating agreement was approved by the Illinois Public Utilities Commission in an order entered May 28, 1919, after a public hearing. On the plea of business men on the South Side, the Illinois Commerce Commission on Nov. 2, 1921, made an order extending the service of the North Shore Line to Sixty-third Street and Dorchester Avenue on the South Side. At both commission hearings the city was represented.

These agreements are said to be in strict accord with the ordinances of 1907, whereby the North Shore Line pays the city of Chicago an annual license fee of $50 per car for each car operated over the elevated lines.

One-Man Cars Still Operating in Oakland

City Seeks Aid to Raise Funds to Install Municipal Bus System—Railway Makes Offer

Resort will probably be had to the ballot in connection with the one-man car dispute in Oakland, Cal. The question of voting bonds to provide funds for municipally operated buses will be put up to the voters just as soon as the provisions of the initiative measure have been met. To this end the public is being asked to sign petitions, and as soon as the requisite number of signatures has been obtained the question of voting the bonds will be put up to the City Council.

What the voters will do if the question ever reaches them is, of course, problematical, but it would seem unlikely that the public will vote to discommode itself by paying an extra fare to ride in city buses, although it has been promised that the city buses will be run with a 5-cent fare, as against the 6-cent fare now being collected by the railway.

The San Francisco-Oakland Terminal Railways, which operates the local Oakland lines, has declared the proposed ordinance "unreasonable and therefore void." Aside from the merit inherent in the company's case in the present controversy its position is strengthened by the fact that a large part of its rush-hour traffic is carried across the bay in the company's own ferryboats and that most of the passengers thus carried transfer to the company's local trolley lines and to its high-speed suburban trains.

In the meantime, the one-man cars continue to be operated despite a city ordinance, but with the approval of the Railroad Commission. There are fifty such cars in use, although some of the larger ones are being run with two-men crews, replacing other cars, which have been sent to the shops. Threats of police action have been repeatedly made against the company by the city officials, but to Nov. 27 there has been no action along this line.

As far as public sentiment about the bus is concerned it seems to be divided. Buses are favored generally as feeders for outlying districts, but there is growing opposition to them in the more congested sections.

The railway itself is the latest to make an offer to run buses. It has filed with the City Council of Berkeley an application to operate buses in that city at a license fee of $60 a year for each bus. This offer has been referred to City Manager Edy for his investigation and report.

The controversy in Berkeley antedates the one in Oakland by a month or two. That city passed an ordinance prohibiting one-man cars and the measure has been respected. One-man cars are not operated within the limits of that city.

In Alameda, too, there is a controversy. It is somewhat different from the others. In that city both the Peerless Stage Company and the railway have offered to run buses. The railway seeks to use the buses as feeders to its trolley lines, but the stage company wants to run buses on regular half hour schedules between Alameda and Oakland. This situation is made truly complex by the fact that the stage company has been refused a franchise in Oakland, the city officials of which desire to run a municipal bus service.

To date the only city run bus in Oakland is the Rosalie. It has been in service since the latter part of October, first on one run and then on another.

The one-man car controversy at Oakland really became acute in August when the company put into use with the approval of the State Railroad Commission a number of one-man, two-man cars. Previous to that time cars of the Birney type had been operated on Telegraph Avenue as far as Alcatraz. The only rumble against these cars came in the form of a protesting resolution passed at the national convention of the Amalgamated Association in Oakland early in September. These cars were only 25 ft. in length.

In August the one-man, two-man cars appeared and immediately the trouble started. Mayor John L. Davie, backed by Commissioner Moorehead, formerly business agent of the Oakland carmen's union, immediately prepared a resolution condemning the cars and then had the resolution passed by the City Council in the form of an ordinance.

Atlantic City and Suburban Strike Declared Off

A truce has been declared in the strike of the employees of the Atlantic City & Suburban Railway, Atlantic City, N. J., against restoration of the one-man cars. Full service on the company's lines has been resumed under an agreement between the company and the men that for one month two men will be placed on all cars, with the exception of the one run between Pleasantville and Absecon, where one man will operate a car during the slack hours. One-man schedules for periods of sparse traffic on other lines are to be put into effect later. The strike followed announcement by the company of the resumption of the use of one-man cars. The men held to their original contention that this operation was dangerous.

Residents of fifteen towns on the mainland, including Pleasantville, Bower's Point and Absecon, were affected by the tie-up. Mayor Charles Jackson of Pleasantville issued permits for buses to operate on the shore road between that city and Atlantic City to relieve the situation.

Franchise Amendment Vote

$1,500,000 to Be Spent by Ottawa Electric Railway if Residents Sanction Plan

Residents of Ottawa, Ont., will have an opportunity on Jan. 7 to vote on the proposal under which the Ottawa Electric Railway will carry out $1,500,000 of improvements. The negotiations toward this end date back to last summer.

On Aug. 10 the Mayor wrote to the company asking under what agreement it would undertake the Feustel improvements and extensions, requiring an expenditure of $1,500,000.

On Aug. 18 the railway submitted a proposal with certain changes, agreed to since the negotiations with the city's street railway committee. Stripped of the "judicial phraseology," in which it is now clothed in a legal document, the agreement is briefly this:

The old agreement of 1893, which has stood the test of thirty years, and was automatically renewed last August for five years more, is to continue in effect with the following amendments:

The company is to have an exclusive franchise to carry passengers within the city limits by street cars or buses operating on regular routes; such franchise not to prevent the operation of cabs, taxis, or buses from outside points.

The company is to have the right to operate a certain number of one-man cars on light traffic lines, with a guarantee that their introduction will not affect the position or seniority of any employee.

The Sunday and limited rates of fare are to be discontinued, leaving a straight 5-cent fare for adults and 3-cent fare for children, with no change in the old rate for school children.

At the end of the present five-year extension of the old agreement (August, 1928) if the company finds it cannot carry on with the 5-cent fare, it may appeal to the Dominion Railway Board to have the rate of fare increased for the next five years.

At the same time if the corporation thinks the company has been making more money than it should out of the 5-cent fare, the city may appeal to the same board to have the rate of fare reduced.

The judgment of the Dominion Railway Board on such appeals to be accepted by the city and the company as final.

Extensions that may be required for the five-year periods after August, 1928, to be settled by a board of arbitration.

These, in short, are the principal terms. The company points out that under the old agreement the city had the right to buy the railway in August, 1923. It did not do so. The old agreement stipulates it may do so at the end of any five-year period after August, 1923; the price to be set by a board of arbitration. The conditions of the old agreement are not changed, except as described previously. Under the new agreement the city still has the right to buy at the same time and under the same terms.

Saginaw Transit Provides Service—Jitneys Disappear

Transportation service is now being furnished Saginaw exclusively by the Saginaw Transit Company, which was granted a franchise last June for street car-bus operation. The jitney buses that aided in the bankruptcy of the old Saginaw-Bay City Railway and later furnished all the local service since Aug. 11, 1921, have ceased to operate. They carried their last passengers on Dec. 1.

While complete city service is now being given by the new company, there is one car line yet to operate. The delay in steel shipments prevented the construction of the double-track switch and the territory that naturally would be served by that line is entirely dependent on motor bus service.

All of the bus equipment has been delivered and just as soon as the one railway route is ready the company will function under terms of the franchise.

Charles S. Kressler, general manager, is doing everything possible to give the proper service and it is generally believed that he will be successful. To ascertain the requirements of the city, a traffic flow census is to be taken of all manufacturing plants.

Mr. Kressler's recent talk to the merchants of the city when he pointed out the high costs of driving their own cars in preference to using the railway service has borne fruit and many business men now leave their automobiles in the garages and use the street cars or buses as the case may be.

In the future each car or bus will carry a neatly printed card bearing the name of the operator.

"Spreckels Day" in San Diego

At a luncheon of the Optimists' Club in San Diego Claus Spreckels told what the San Diego Electric Railway was doing for Greater San Diego. Mr. Spreckels called on his department heads to arise in turn and give an account of themselves and their activities. E. J. Burns, assistant general manager of the San Diego Electric Railway, referred to the construction work being undertaken by the railway and its resultant expenditures. The plan of the Optimists' Club is to entertain the department heads of San Diego's largest business concerns at a series of noonday luncheons. This particular day was celebrated as Spreckels Day.

Subway Plans Ordered

Mayor Rolph of San Francisco has ordered City Engineer O'Shaughnessy to prepare plans and estimates for the Market Street rapid transit subway, saying it was proposed to submit improvements to the people at special elections to be held later. This was Mayor Rolph's first act after his re-election.

Employees to Purchase Securities

Will Create Purchase Fund Out of Wage Increase, Suggestion Made by Thomas E. Mitten

Employees of the International Railway, Buffalo, have voted to use the 2½ cents an hour wage increase granted by the company effective on Jan. 1, 1924, to create a fund for the purchase of securities of the company. Because of the low prices now quoted for the 5 per cent bonds and the common stock of the company, the employees consider that an unusual investment opportunity is presented by these securities.

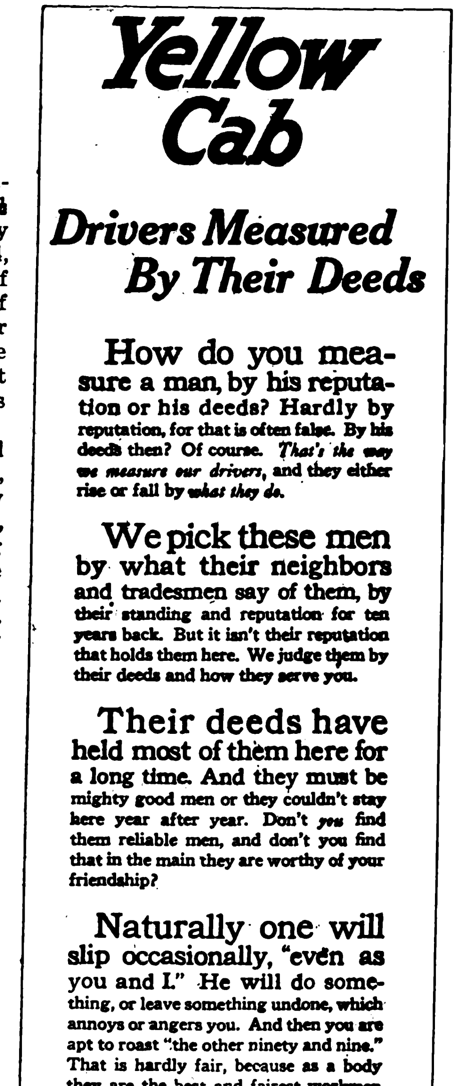
The formation of the investment fund was suggested by Thomas E. Mitten, chairman of the board of the railway and president of Mitten Management, Inc., which has a contract for operating the International. The wage increase will total approximately $200,000 a year and the employees have voted to divert this money to the purchase of the company's securities in their own interest. According to figures presented by Mr. Mitten the $200,000 will at present prices purchase $200,000, par value, of 5 per cent bonds of the company and $1,000,000, par value, of stock. The return on the bonds will be immediate, but for the present at any rate the virtue of the stock will lie in the appreciation in its quoted price as the condition of the company improves. In fact Mr. Mitten said that any appreciation in the value of the stock rests largely on the successful operation of the property through co-operation of employees and employers. The bonds are now selling at $50 for each $100 par value and the stock is quoted at $10 for each $100 share.

In announcing the wage increase of 2½ cents an hour, Herbert G. Tulley, president of the International, explained that Buffalo paid during the first part of the year 2½ cents an hour more than the average wage of Rochester and Cleveland, but during the latter part of the year the basic wage was 2½ cents below, the result being that for the entire year the wage rate paid by the International has averaged the wages paid in these two cities. The Cleveland rate now is 60 cents and Rochester 55 cents, the average being 57½ cents.

Mr. Tulley said that while the company is not now actually earning sufficient money to pay the wage increase, square dealing with employees calls for wage readjustments whether they be up or down. In view of the fact that the Buffalo scale is based on the average of Rochester and Cleveland the directors decided to grant the 2½ cents increase, making the Buffalo rate 57½ cents an hour for trainmen.

At the quarterly meeting of the board Mr. Tulley announced that the deficit in the company's income during the year to Nov. 1 was $853,962. He estimated the total deficit of the year to Dec. 31, 1923, at $1,000,000. He said that through economics in operation, impossible under the labor conditions that existed before the strike, the company could return to the 5-cent fare if it were carrying upon its cars all passengers now transported in jitneys, club cars and in privately owned motor cars. The present fare is 7 cents with four tokens for 25 cents.

The president of the co-operative committee submitted a report showing that during the year fifteen members had died and that $15,000 in insurance had been paid to their families. Sick benefits of $10,379 had been paid and $20,000, par value, of the company's gold bonds had been acquired. There is now a cash balance on hand of $4,515 as the result of the first year's operation of the Mitten co-operative plan.



Yellow Cab

Drivers Measured By Their Deeds

How do you measure a man, by his reputation or his deeds? Hardly by reputation, for that is often false. By his deeds then? Of course. *That's the way we measure our drivers,* and they either rise or fall by *what they do.*

We pick these men by what their neighbors and tradesmen say of them, by their standing and reputation for ten years back. But it isn't their reputation that holds them here. We judge them by their deeds and how they serve you.

Their deeds have held most of them here for a long time. And they must be mighty good men or they couldn't stay here year after year. Don't *you* find them reliable men, and don't you find that in the main they are worthy of your friendship?

Naturally one will slip occasionally, "even as you and I." He will do something, or leave something undone, which annoys or angers you. And then you are apt to roast "the other ninety and nine." That is hardly fair, because as a body they are the best and fairest workmen we ever knew.

Just take notice of them when next you are on the street. See how busy they are and how seldom you see one loafing. They are alert, intent on their business, earning a living and anxious to please.

***Be nice to them if they are nice to you.* They are part of your daily life. Give them a smile once in a while. A smile is a big thing.**

The thinking fellow calls a Yellow

Yellow Cab Co.

'Phone Calumet 6000

Why Not Some Advertising of This Sort, Boosting Electric Railway Trainmen? It Would React Favorably on the Men as Well as on the Car Riders. If They Did Not All Measure Up to the Standard Set in the Ad. Such Advertising Would Inspire Them to Try to Measure Up

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Oklahoma City-Shawnee Interurban Line Planned

The Corporation Commission of Oklahoma has recommended approval by the Interstate Commerce Commission of a project to refinance and rehabilitate the old Oklahoma City-Shawnee-Atoka line of the Katy railroad, which has been in financial difficulties for several years. The line was disposed of at receiver's sale on Sept. 28, this year, and K. W. Shartel, attorney, of Oklahoma City, and others, are asking authority to issue bonds and stock to refinance the property.

If the Interstate Commerce Commission accepts the recommendation of the Oklahoma commission the line probably will fall into the hands of two companies organized for the purpose of operating it, the Oklahoma City-Shawnee Interurban Railway and the Oklahoma City-Ada-Atoka Railway. The former project contemplates electrification of the line from Oklahoma City to Shawnee and the latter to operate steam-propelled cars from Shawnee to Atoka.

Final ownership of the property depends upon success of efforts to issue $800,000 of common stock and an equal amount in first mortgage bonds in connection with each project and other financing details. There is a possibility that the proposed electric portion of the line may be acquired by the Shartel interests and run in connection with the interurban system of the Oklahoma Railway, now operating lines from Oklahoma City to Norman, to Guthrie, to El Reno and intermediate points on each line.

Mr. Kempster Returns After Illness.—After an absence of several months, due to illness, A. L. Kempster, general manager of the New Orleans Public Service, Inc., made his first public appearance at a dinner tendered him on Nov. 27 by the Commercial Club's members of the corporation. Mr. Kempster gave a short talk to the assembled corps of workers of the utility on its purpose and obligations to the public and the best methods to be employed to advance their joint interests.

City Operates Bridge Service

Brooklyn Surface Lines Withdraw from Williamsburg Bridge When City Takes Over Shutle Line

Shuttle service over the Williamsburgh Bridge between Marcy Avenue, Brooklyn, and Essex Street, Manhattan, was started on Dec. 1 by the city of New York with rolling stock equipment of its own. Operation is under the direction of the Department of Plants and Structures, with Grover A. Whalen, head of the department in charge. The run from terminus to terminus of the bridge is a little more than a mile. Tickets are sold at the rate of three for 5 cents. The equipment on hand consists of fifty-four cars, composed of thirty-two Birneys bought especially for the bridge service and twenty-two rebuilt cars secured previously from the Second Avenue Railroad for use on the city's line on Staten Island.

On the morning that this service was begun the Nassau Electric Railroad, the Brooklyn, Queens County & Suburban Railway, the Coney Island & Brooklyn Railroad and the Brooklyn City Railroad, all operating surface lines in Brooklyn, withdrew from the operation of cars across the bridge from Brooklyn into Manhattan. These lines now all terminate near the Bridge Plaza, Brooklyn, and former patrons of them desiring to travel to Manhattan are required to pay an extra fare on the bridge locals operated by the city or else take the elevated line over the bridge from the plaza, for which they must pay an extra fare of 5 cents. It is, however, possible for a few of them to take cars of the New York City surface lines at the plaza in Brooklyn, for in contradistinction to the service operated from Brooklyn into Manhattan by the Brooklyn lines the New York surface lines, or more properly the Manhattan surface lines, operate from Manhattan into Brooklyn.

The original terminus of the Brooklyn lines which have been using the bridge was at the ferries at the foot of Broadway, Brooklyn, but with the opening of the bridge ten years ago a new approach to Manhattan from Brooklyn was afforded and the Brooklyn lines began to operate into Manhattan over the bridge, but there was not franchise obligation in connection with this operation. In addition, in accordance with a contract with the city now expired, the Brooklyn surface lines operated the purely local shuttle service over the bridge. The contention of the Brooklyn surface companies is that they were able to continue operation of their lines into Manhattan because they have been able partially to pay the added cost which the through service has entailed from the revenues derived from operation of the local service on the bridge. The Brooklyn companies regarded the determination of the city to take over the local bridge service to be not only detrimental to the best interests of the traveling public but unfair to the companies affected.

The companies said they could not possible, from a physical standpoint, continue their service in connection with the city service. The shuttle service as handled by the Brooklyn companies was about 40,000 passengers a day. In addition 68,000 passengers a day were handled on the through cars. The fare on the private shuttle line was 2 cents cash with three tickets for 5 cents.

It had been indicated that Mr. Whalen would ask the Transit Commission to take action to compel the Brooklyn surface lines to continue to run their cars across the bridge. The Transit Commission says that it has no such power. The commission points out, as the companies had done previously, that the Brooklyn lines have not been operating surface cars upon the bridge under corporate franchises.

Immigration Program at New York Meeting

Administrative leaders in Washington, not only in the House and Senate, but in executive departments as well, will follow the recommendations laid down in the message of President Coolidge, and be guided by the nation at large on the question of needed immigration laws. Advices to this effect have been received from official sources by the sponsors of the National Immigration Conference, which will be in session at the Hotel Astor in New York, on Dec. 13 and 14.

The immigration conference in New York will be the first of its kind ever held. It will be attended by representatives of business organizations, official departments of the government, public and social service organizations, delegates of several foreign governments, and individuals who have made a study of the whole effect of immigration on the national life. The conference has been arranged by the National Industrial Conference Board, which found at the end of a two-year study of the problem both here and abroad that definite information on which to base new laws was desired by legislators and industrial leaders of the country. The present per centum act expires next June and its retention or new laws form one of the major questions now before Congress.

Wages in Philadelphia to Be Increased

The Philadelphia Rapid Transit Company is to raise its basic wage from 64 cents to 65 cents an hour on Jan. 1. Any further increase in 1924 will be paid to the trustees of the co-operative wage dividend fund. Average of the three cities used as a basis for Philadelphia Rapid Transit wages is 67½ cents an hour, Chicago being 73 cents, Detroit 70, and Cleveland 60, so on the present scale there would be 2½ cents an hour to be paid to Philadelphia Rapid Transit wage fund trustees.

Indeterminate Franchise Suggested for Los Angeles

The Board of Freeholders elected at the last general election in Los Angeles for the purpose of framing a new city charter has approved a charter provision for the indeterminate type of franchise.

The proposed charter amendment as adopted is subject to exhaustive conditions and will allow the widest latitude possible in the selection of the type of franchise desired, whether for a fixed or indeterminate period of time. The proposed amendment to be incorporated in the new city charter gives the City Council of Los Angeles the power to grant either a fixed or indeterminate franchise.

Such a condition will allow public utilities or the city to carry out a program of expansion and alleviate troubles of that character that have been difficult to solve in the past.

A protection of the city's ultimate development of a subway or elevated railway system is contained in the amendments to the charter by a provision that gives the city power to revoke any franchise in or upon any of the streets within the part of the city bounded by Temple Street, Figueroa Street, Washington Street or Central Avenue on a year's written notice.

One Freeholder attempted to draw up a provision relating to transportation utilities, with a view of incorporating a clause for an eight-hour day for platform workers, but the amendment failed to carry that provision.

Ford Road May Be Electrified by Spring

Work on the electrification of the Detroit, Toledo & Ironton Railroad, the Ford road, is well under way. Completion of the work depends, however, upon the development of the Ford power house at River Rouge, Mich. Work on the first of eight 62,500 hp. units of the power house is 85 per cent completed. A test run of the first unit of this plant is scheduled for next January. The second unit is about 15 per cent completed.

The output of the plant will be used entirely for Ford industries, including the Detroit, Toledo & Ironton Railroad.

Work on the turbines was started more than a year ago at the Ford shops following the installation of two units of 12,500 kw. each, made by an outside firm. The production of the new turbines was undertaken by engineers and machinists who helped develop Ford automobile production methods and handled the manufacture of turbines for the Ford "Eagle" boats.

In connection with the electrification of the Detroit, Toledo & Ironton Railroad, the double track from River Rouge to Flat Rock is more than half completed. This is the first section on which electricity will replace steam. All of the activities toward electrification of the first section are scheduled for completion next May.

Payment of Franchise Tax in Cincinnati in Prospect

Settlement of Cincinnati's traction problem is foreseen in the action taken at a recent meeting of the Hamilton County executive and advisory committee. One outstanding feature of the meeting was the adoption of a resolution which indicated that the organization would work to bring about the immediate payment of the $350,000 franchise tax due yearly from the Cincinnati Traction Company and induce better service and lower rates of fare. Committees representing the traction company and the Cincinnati Street Railway, which leases the railway system, have been negotiating for the past two years in an effort to bring about a settlement of the matter, but little progress has been made in the direction of a settlement. Therefore the city administration appears to be determined to force one of the companies to act.

Some members of the Republican organization are of the opinion that the only definite step is to refuse any further deferment of the franchise tax. Others feel that a forfeiture of the traction company's franchise is the surest move, while still another group contends that a consolidation of the Cincinnati Traction Company and the Cincinnati Street Railway and a divorcement of the traction company from its subsidiary companies would solve the problem. It was announced that Mayor George P. Carrel would upon his return to the city call a meeting of the Citizens' Traction Committee, appointed by him more than a year ago, to ascertain what that body has accomplished. It was stated that the Citizens' Traction Committee has been awaiting a decision from the committees representing the traction company and the street railway before making any recommendations. The traction committees have not been in session for more than three months, but since that time the Cincinnati Street Railway has made an offer to the Cincinnati Traction Company to take back the system for $1,000,000, which the latter company turned down.

Home Rule Legislation Chief Problem Before Legislature

So great and so complicated are the problems presented by the new home rule for cities amendment to the New York State Constitution, adopted by the people at the general election in November, that virtually no other legislation will be considered, or even drafted, until a tentative program for putting the home rule provisions into effect has been promulgated.

This applies particularly to public utility legislation, as until the exact scope of changes in the present law and the additional legislative powers that will be given cities under the provisions of enabling acts to carry the constitutional amendment into effect have been definitely determined any change in the statutes affecting public utility regulation in so far as their regulation by municipalities is concerned would be entirely without standing.

The first problem the Legislature of 1924 will have for solution will be the granting of specific powers to cities under the home rule amendment. In the interval a conference of mayors of the different cities is to be had to obtain the views of various executives as to just what powers are wanted. So that whatever public utility legislation is considered as a part of the legislative program of 1924 will be coordinated with and subject to the program which is ultimately adopted with reference to the application of home rule.

Hollywood Chamber of Commerce Makes Another Attempt to Compel Extensions

The Hollywood Chamber of Commerce recently renewed its fight to compel the Los Angeles Railway to extend several of its lines, totaling 10½ miles of single-track construction, into the Hollywood district by the filing of a petition for a rehearing of its entire case with the State Supreme Court. The petition sets forth that the tribunal, in its previous decision against the car line extensions into Hollywood, was not in full possession of the facts.

The original petition for a writ of mandate was denied by the State Supreme Court in a decision handed down on Oct. 31, the decision being based on the ground that the Railroad Commission of the State of California had no power to order or compel the railway company to extend its lines when no franchise to construct the line had been applied for, or granted. This matter was reviewed in the ELECTRIC RAILWAY JOURNAL, issue of Nov. 10, page 832.

At the time that the court handed down its decision in denying the Railroad Commission jurisdiction in such matters, the court drew a distinction between a railway franchise and franchises under which other public utilities, such as water, gas, electric and power companies, operated. The railway franchise, the court sets forth, specifically limits the amount of territory to be served whereas the franchises of other public utilities do not contain such a provision. The extensions of carlines demanded, the court ruled, could only be obtained under a new franchise.

The Chamber of Commerce in its petition for a rehearing claims that the charter of the railway contains a clause providing for extensions into new territory, although it is admitted that the ordinary railway franchise does not do this. This declaration, it is cited, is as binding as a franchise when a district to be served offers remunerative traffic.

The territory specified is already served by the Pacific Electric Railway lines. The cost of the extensions is estimated at $1,500,000.

One-Man Car Agitation Dropped

The referendum petition for the abolition of the one-man cars in Massachusetts, which was to be filed Dec. 5, was not filed. Not enough people were interested to carry out the threatened referendum. Presumably, this closes the agitation in Massachusetts, at least for the present.

News Notes

Adjustment May Effect Electrification Project.—Litigation that has prevented work on the electrification of the Missouri, Kansas & Texas Railroad between Dallas and Denton may be ended through the efforts of the citizens of Dallas to bring about an adjustment of the opposition of residents on one street in the city of Dallas toward the construction of the interurban railway track. Arrangements for carrying out the work of electrification have been completed.

Elevated Use Unsettled.—The question of the continued use of the elevated railway at Kansas City has not been settled. Judge Stone of the Federal court said recently that both Kansas City, Kan., and Kansas City., Mo., would have to do away with the rentals which have been charged to the Kansas City Railways, but neither city would agree to do this. Consequently, the matter is still open and appears likely to remain open until after the question of lifting the receivership of the railways has been settled.

Grants Wage Increase.—The United Railways & Electric Company, Baltimore, has granted a wage increase to its employees amounting to about 2 per cent. The change takes effect Jan. 1. The largest class of employees, motormen and conductors, will receive from 46 to 51 cents an hour instead of from 45 to 50 cents.

Mr. Craig's Sentence Remitted.—President Coolidge on Dec. 5 remitted the sixty-day jail sentence imposed upon Charles L. Craig, Controller of New York City, by Federal Judge Julius M. Mayer of the United States Court for the Southern District of New York, for criminal contempt of court. This action was recommended by Attorney General Daugherty after consideration of the case by the legal staff of the Department of Justice. The Attorney General and his advisers opposed the granting of an outright pardon and severely criticised Mr. Craig, and the President approved the department's recommendations for only a remission of the sentence. Sentence was passed upon Mr. Craig by Judge Mayer because the court was convinced that Mr. Craig had cast aspersions upon the court that were in no way justified by the facts. Mr. Craig's remarks were made in connection with the court's handling of the affairs of the Brooklyn Rapid Transit Company, then in receivership.

Ordinance Provides for Terminal Change.—Commissioner Paul H. Maloney of the department of public utilities of the New Orleans Commission Council has offered an ordinance for adoption which provides for the removal of the terminus of the Orleans-Kenner Electric Railway from its present site to South Liberty Street. The purpose sought by the Maloney ordinance is to relieve the existing traffic conditions in South Rampart Street, near Canal, which the report by John A. Beeler referred to as a menace to public safety. The ordinance represents the conclusions reached by the city officials and those of Jefferson Parish after a long series of conferences. The Orleans-Kenner line is not released, under the ordinance, from carrying out its obligations, under its franchise, to build a permanent terminal in New Orleans.

Men from Offices Act as Trainmen.—When twenty-four out of twenty-five operators of cars on the Holland division of the Michigan Railway failed to report for work on Dec. 1, officials of the company left their desks and became motormen for a day. F. W. Brown, general superintendent of the company, said the trouble had started when the men objected to the combination of freight and passenger business in one run. He announced that the men had violated their agreement with the company which provides that in case a matter at issue is not settled between the superintendent and the men it shall be referred to the general manager, and then, if still unsettled, shall go to the arbitration board. The twenty-four operators were not permitted to resume their work.

Reaches Agreement on Service.—The Public Service Commission on Nov. 16 closed its records on the complaint of the Woodlawn (Erie County) Taxpayers Association against George Bullock of the Buffalo & Lake Erie Traction Company, in relation to car service between Woodlawn Beach and Buffalo. This action was taken by the commission on an agreement of the receivers of the Buffalo & Lackawanna Traction Company and the Hamburg Railroad to operate their respective cars so as to meet at least once an hour for an interchange of passengers at the Hamburg turnpike at the Buffalo city line.

Foreign News

Interchangeable Season Tickets in London

A new form of interchangeable season ticket, good on railway, tramway and bus, has been used by the London Underground Railway and associated companies as an experiment since last May. It has proved so successful that the scheme is being further extended. The ticket, which is a season one, has been tried up until recently at Golder's Green Station. It enables a passenger living beyond that place to board a bus or a tramcar, travel to Golder's Green Underground Railway station and continue his journey by the railway. Over 1,000 tickets of this kind are now in daily use at this point. The scheme has been extended to a number of other suburban stations on the Underground Railway, and still further extensions are contemplated.

British Fare Agitation as Seen by "Journal" Representative

There is some agitation in nearly every city in the United Kingdom for a return to the pre-war rates of fare on electric railways, according to a representative of the ELECTRIC RAILWAY JOURNAL, who recently has returned to this country from a trip abroad. At least, there is periodic clamor for reductions in the rates being charged. The argument against a reduction in the rate of fare beyond the point that is justified, which seems to impress the public, is that the taxpayers in a community are discriminated against unjustly when street car fares are reduced to the point that does not allow an adequate return on the investment. Street cars are used by taxpayers and non-taxpayers alike. They are used extensively by people from other communities, and by visitors generally. If the fare is too low it means that the visitors and the non-taxpayers benefit at the expense of the community. If the fares do not provide for the return on capital and the maintenance and extension of lines, the necessary funds must come, directly or indirectly, from the city treasury. It is easy to demonstrate how an unremunerative rate of fare on a street railway would discriminate against the community and differs in that respect from electric, gas or water service which is installed in tax-paying property. If the charge for the service does not pay its cost, it is paid indirectly by those who use it. The public in Great Britain seems only recently to have grasped this phase of the fare situation and it has done much to temper the demands for unjustifiable reductions.

Weekly Passes on Four British Tramways

The experiences of Bradford and Doncaster, with a population of 300,000 and 54,000 respectively, with the weekly pass have induced the Rotherham and Colne Corporation Tramways to try the same plan. The population of Rotherham and Colne is 75,000 and 26,000 respectively. The Rotherham Tramways installed a series of passes on Nov. 12 at rates ranging from 1s. 6d. for 1d. stages to 4s. for stages costing 3.5d. to 4d. total. The Colne pass will cost 2s. The weekly pass is arousing great interest among other British tramways, which hope thereby to be able to retain the usual 1.5d. minimum fare for all but regular riders instead of being compelled to go back to the pre-war fare of 1d. for single trips. In some cases, therefore, the pass prices are being considered on the basis of giving a reduction to regular riders at little or no loss compared to what would follow a cut to the lower base fare for everybody.

Esthonia Plans Improvements

The Esthonian government plans spending 30,000,000 Esthonian marks for railway improvement and 25,000,000 marks for the construction of railway building. In addition 34,000,000 marks will be used for the electrification of the Reval-Nemme line.

Zurich Street Railways Extend

The report of the Zurich Municipal Street Railways (serving 199,567 inhabitants) for the calendar year 1922 is notable for announcement of extensions. In March, 1922, construction was begun of an extension costing 680,000 francs (approximately $136,000). In September a credit of 198,000 francs ($39,600) was granted for a second extension. The number of single-track miles in operation increased from 49.3 miles to 50.9 miles, exclusive of some 4.8 miles of carhouse and yard trackage.

The number of passengers declined slightly over 1921, viz., from 46,660,218 to 46,273,856, and revenue dropped from 11,716,327 francs to 11,577,076 francs. The average fare was 25 rappen or practically 5 cents. The average number of rides per inhabitant per annum was 232 compared with 230 in 1921. The city service amounted to 11,400,343 car-km. (say 7,068,000 car-miles), of which 3,018,653 car-km., or 1,872,000 car-miles, was furnished by trailers. The annual service per inhabitant was 57 car-km., or 35.3 car-miles. This was achieved with 241 motor cars and eighty-seven trailers.

There was no change in fares. Some 24 per cent of the riders used the 20 rappen or minimum single fare, another 15 per cent paid 30 rappen and about 8 per cent paid 40 rappen. Most of the remaining fares were paid in the form of weekly limited-ride tickets, workmen's tickets and unlimited-ride, non-transferable season tickets or passes. Total gross for the year was 11,774,808 francs, while operating expenses increased 0.46 per cent to 9,740,249 francs, leaving 2,034,558 francs for overhead charges, renewal funds and the like. Beginning with the year 1920, it has been possible to meet all of these costs and also to reduce to 1,589,296 francs (end of 1922) the deficit of 2,842,256 francs which had accumulated over the period 1914-1919 because of war conditions.

Financial and Corporate

Operation Unified

Railway Near Philadelphia Co-ordinates Its Lines and Buses—Population Served Greatly Increased

Events are taking place rapidly in the affairs of the West Chester Street Railway, West Chester, Pa. In the last six months the company has acquired many miles of track and more than 100 miles of bus routes. This has resulted in an increase in population contact from 42,000 to more than 300,000.

The West Chester Street Railway formerly operated a line of 21 miles of single track extending from West Grove through Avondale and Toughkenamon to Kennett Square, a distance of 7½ miles, extending thence southward a distance of 14 miles to Brandywine Springs on the outskirts of Wilmington. Almost the entire population served by the railway was located on the Kennett-West Grove division, the earnings of which are understood practically to have carried the whole property.

During the early part of the current year the interest controlling the old property decided to cease operation, and service was stopped during April, 1923. The property was purchased by a bondholders' committee under foreclosure proceedings, and sold by it to local interests. An attempt was made by the purchasers to refinance operation of the whole property, but this attempt was finally abandoned and the 7½-mile section between Kennett and West Grove was sold to the same interests which control the West Chester Street Railway, operating a railway from Coatesville through Downingtown and West Chester to Kennett Square. The West Grove division will be connected with the Kennett division of the West Chester Street Railway and through service operated from West Grove to West Chester.

In order to effect revival of service between Kennett and West Grove it was necessary, under the Pennsylvania State Laws, to reorganize the West Chester, Kennett & Wilmington Electric Railway, this being done under the name of the Chester County Traction Company, which will be a subsidiary of the West Chester Street Railway. In this manner the population per mile of track operated on its Kennett division will be increased. The section of railway between Kennett and Brandywine Springs was sold to the S. Snyder Corporation, Rochester, N. Y.

The West Chester Street Railway has through its subsidiary, the People's Transportation Corporation, acquired control of all the motor bus routes in southern Chester County, connecting points in this district with the cities of Chester, Pa., and Wilmington, Del., and a co-ordinated plan of railway and motor bus transportation for the entire district is now being worked out.

$1,325,896 Balance Reported at New Orleans Under New Agreement

The New Orleans Public Service, Inc., has reported for the year ended Sept. 30, 1923. This is the first year of operation under the new agreement at New Orleans. The balance indicated as available for sinking fund requirements, dividends and surplus return was $1,325,896. The rate base was fixed to begin at $44,700,000. The rate of fare dating from Sept. 27, a year ago, was 7 cents. The statement of earnings follows:

INCOME STATEMENT OF NEW ORLEANS PUBLIC SERVICE, INC., BY DEPARTMENTS FOR TWELVE MONTHS TO SEPT. 30, 1923

	Railway	Electric	Gas	All Departments
Operating revenue	$7,571,560	$3,914,109	$2,743,750	$14,229,420
Operating expenses, including renewals and replacements reserve	5,331,175	2,229,132	1,686,908	9,247,215
Net operating revenue	2,240,385	1,684,977	1,056,842	4,982,205
Taxes and uncollectible consumers' accounts	*862,258	451,930	321,293	1,635,482
Net operating income	1,378,127	1,233,047	735,549	3,346,723
Miscellaneous income	93,502	28,239	33,642	155,384
Gross corporate income	1,471,629	1,261,286	769,191	3,502,107
Income deductions				2,176,211
Balance available for sinking fund requirements, dividends and surplus reserve, in accordance with ordinance No. 6822 C.C.S.				$1,325,896
				Average for Year
Rate base				$52,939,371
Per cent earned				6.61

* Represents taxes only.

Commissioner Maloney of the Department of Public Utilities announced on Nov. 25 that he expected to complete soon the negotiations between the city and the Public Service, Inc., over the rate base on which the company is to be permitted to fix its rates for the ensuing year under its agreement with the city. As indicated in the accompanying statement the company in its annual report under the agreement with the city reported a rate base of $52,939,371 and a return for the twelve months of 6.61 per cent, which is 0.89 per cent under the return allowed by the franchise.

The city had the books of the company audited, and as a result, Commissioner Maloney says he is opposed to both the rate of return and the rate base shown in the company's report. He thinks the rate of return is larger than shown and the rate base should be lower. The dispute between the city and the company, he says, is over several large items carried by the company as a part of the rate base. It is understood that under the rate base claimed by the city the company will show a return of more than 7 per cent, or less than one-half of 1 per cent under the rate allowed by the franchise.

Some New York Companies Do Better

The New York Transit Commission has made public statements concerning railway operations in New York during the month of September, compiled from monthly reports furnished to the commission by the several companies. The figures for September, 1923, are compared with those for the similar month in 1922.

The Interborough Rapid Transit Company, with gross of $4,315,178.09, gained, in operating revenue, $57,095.60 over September, 1922, while operating expenses of $2,685,495 represented a decrease of $62,236. The net corporate deficit of the company for the month was $211,027, less by $56,981 than in September, 1922. Interborough passengers carried in September, 1923, numbered 79,631,000, which was 1,381,211 over the previous September. The Interborough subway operations ran behind $21,513 in September, about $25,000 less than last September's deficit, the big loss occurring on the elevated lines.

The New York Rapid Transit Corporation (B.-M. T.), with gross of $2,056,426, gained $151,843 in operating revenue, while at $1,399,078 its operating expenses decreased $9,901. The company showed a net corporate income for the month of $91,727.53, as against a deficit of $71,207 under the receivership in 1922. Passengers carried numbered 40,078,420, a gain of 3,043,471 for September, 1923, as against September, 1922.

The New York Railways, with gross of $758,524, showed a decrease in operating revenue of $60,626. Operating expenses of $654,674 were $38,533 less than for the similar month in 1922. The net loss of $139,662 was $6,500 more than in September, 1922. With traffic of 13,428,905 the company carried 1,045,776 fewer passengers in September, 1923, than in the similar month in 1922.

The Third Avenue Railway system had a net corporate income of $20,824, or $12,495 less than September, 1922. Passenger traffic was 4,893,081, or 173,798 less than in September, 1922.

Mr. Fagan's Figures Attacked

Special Master, Representatives of City and Pittsburgh Railways' Reorganizers Question Receiver's Figures

At the proceedings conducted before the court on Nov. 26 with the end in view of lifting the receivership of the Pittsburgh Railways three elements were on record as declaring the railway solvent. They are former Judge Wasson, special master for the court; the city of Pittsburgh, and the railways company reorganizers, as represented by the Philadelphia Company. As stated previously, Charles A. Fagan, one of the receivers, holds that the company is still insolvent.

Special Master Henry G. Wasson, delegated by the court to inform it whether the reorganization was possible at this time, recommended the reorganization. He figured the working assets of the company at the end on one year's operation by the owners would be $1,795,075.

Receiver Fagan of the railways acting independently of his two colleagues, Receivers W. D. George and S. L. Tone, informed the court, shortly after the Wasson recommendation was filed, that the railways, instead of being solvent, was still "manifestly insolvent" and he submitted figures to show that instead of a surplus the railways after one year's operation would show a deficit of at least $1,285,207 or, if other elements were considered, a deficit of $3,036,668.

The city's figures, with those of the Philadelphia Company, parent company of the Pittsburgh Railways, were filed with the court on Nov. 26, the latter in the name of the Pittsburgh Railways as a corporation, and in the form of an answer to Mr. Fagan's figures.

A surplus at the end of the first year's operation, instead of a deficit of $1,500,723 is claimed in the reply to the Fagan figures submitted in behalf of the reorganizers by A. W. Robertson, vice-president and chief counsel. Mr. Robertson's petition is in part as follows:

> From an examination of the items in Exhibit A, attached to Mr. Fagan's report as made in detail in our Exhibit 2, it will be seen that items totaling $1,101,930 are duplicates and are included twice in the figures shown in said Exhibit A, and that the total deductions in said exhibit should be reduced by the amount of such duplication.
>
> A further examination of Exhibit A discloses that it includes $1,684,000 as payment of retirement of capital, which is not properly chargeable against operating expenses, and which the company has no expectations whatever of paying out of the operating income, but does expect to pay such obligations as they come due in future years by selling other securities or extending the time of payment of the respective obligations themselves.
>
> Taking into account these several items, the aggregate of the sums which must be met during the coming year are reduced to $4,800,728. This leaves a surplus of $1,500,723, instead of a deficit as shown in the original Exhibit A.

Partial Discontinuance Allowed.—The Public Service Commission recently granted permission to the Massachusetts Northeastern Street Railway to discontinue its railway service on 3 miles of its road between Rowe's Corner, Newton, to the state line at South Hampton. Residents of Newton protested against the discontinuance of this branch.

Abandonment Threatened at Astoria, Ore.

The railway at Astoria, Ore., will probably be abandoned. The system is one of a little more than 5 miles. It is owned by the Pacific Power & Light Company. Just about a year ago, Dec. 8 to be exact, an area of thirty-five city blocks was wiped out by fire and the railway and the power and light lines of the company were damaged to the extent of about $175,000. Fortunately the main feeders of the company were installed just beyond the limits reached by the fire, so that power and railway service were quickly resumed. More than fourteen blocks of railway track was destroyed. The necessity arises now to rehabilitate the railway system. That work the company's engineers estimate would cost $150,000. As the railway is a losing proposition the company has notified the local City Commission of its intention of abandoning the railway.

Auction Sales in New York

At the public auction rooms of A. H. Muller & Sons the following securities were sold on Dec. 5:

4,000 shares Interborough Consolidated Corporation, common, 5 cents per share.

505 shares of Second Avenue Railroad, 50 cents per share.

$5,000 Second Avenue Railroad 6 per cent receiver's certificates, 37⅜ per cent flat.

$41,000 Second Avenue Railroad first consolidated 5 per cent bonds, due 1948, certificates of deposit 3 per cent.

1,000 shares of Mobile Light & Railroad Company, $1 per share.

310 shares of Interborough Consolidated Corporation common, $3 lot.

300 shares of Interborough Consolidated Corporation common; 550 shares Interborough Consolidated Corporation preferred, $100 each, $85 lot.

50 shares of Brooklyn Rapid Transit Company, $2 lot.

Permission Sought to Abandon Suburban Line in Oklahoma

The Pittsburgh County Railway, which operates city lines in McAlester and North McAlester and an interurban line to Hartshorne, Okla., will be heard on Dec. 20 before the Corporation Commission on a petition seeking permission to abandon its line extending from the eastern limits of McAlester to the country club. During the past two years, the petition recites, the line has been operated at a great loss. In fact the petition states that the whole city system is being operated at a loss and continued operation of the country club line will only increase the financial burden now placed on the entire system. Business began falling off on the country club line as early as 1919, when the company secured an order from the commission permitting it to suspend service from April 1 to Nov. 1 of each year. The company now desires permission to abandon the line entirely and take up the tracks.

Negotiations on to Lift Birmingham Receivership

The receivership of the Birmingham Railway, Light & Power Company, Birmingham, Ala., may be lifted soon after Jan. 1. J. S. Pevear, co-receiver for the company, and W. B. White, attorney representing Lee C. Bradley, the other receiver, have been in New York working toward that end.

It has not been made public in Birmingham how the transaction will be handled, but it has been indicated that local interests may borrow the money in New York, give the property of the company as security, and operate it themselves.

Preferred Stock Offered.—Harrison & Company and Janney & Company, Philadelphia, Pa., are offering $1,400,000 of the first preferred 8 per cent cumulative stock of the Georgia Railway & Power Company, Atlanta, Ga., series of 1924. The price is 104 and accrued dividends to yield 7.69 per cent.

Mortgage Gold Bonds Offered.—A syndicate, headed by Drexel & Company, Philadelphia, Pa., is offering $4,000,000 of the first and refunding mortgage 5 per cent gold bonds of the Southern Public Utilities Company, Charlotte, N. C. The bonds, dated July 1, 1913, and due July 1, 1943, are offered at 91¼ and interest to yield about 5.75 per cent. This is an additional issue, the proceeds for which will reimburse the company in part for capital expenditures already incurred in excess of $7,800,000, which includes the cost of the new 80,000 installed hp. Mountain Island hydro-electric station to be put in operation next month.

Board Has Vacancy.—The death of former Governor Samuel W. McCall of Massachusetts creates a vacancy in the board of trustees of the Eastern Massachusetts Street Railway, Boston, Mass. Mr. McCall was one of the five public trustees having been appointed to succeed Homer Loring, former chairman, who resigned. The terms of the trustees, who were appointed for a five-year term, expire in January next. The law requires appointment of successors to serve for another five-year period beginning in January. The four remaining trustees are Arthur G. Wadleigh, chairman; Fred J. Crowley, Isaac Sprague and Earle P. Charlton.

Collateral Securing Notes Sold.—At an auction of $3,000,000 first lien and refunding mortgage gold bonds of the Washington-Virginia Railway, Washington, D. C., the entire amount was bought by Edward P. Hopkinson, Jr., representing the note holders, for $2,000. The 6 per cent notes, which matured on Jan. 1, 1922, were secured by these bonds. Before the sale R. H. Phillips representing some of the bondholders, stated he thought bidders should know that receivers had been appointed for the company, and he deemed it improper that the bonds should be sold without an order of the court.

Traffic and Transportation

Commission Recommends Traffic Improvements

The Los Angeles Traffic Commission has recommended to the City Council that certain practices be adopted for bettering traffic conditions. One provision calls for immediate adoption of an ordinance prohibiting the parking of passenger vehicles in the downtown congested district of the city from 7 to 10 a.m. and 4 to 6:15 p.m. instead of only from 4 to 6:15 p.m. as at present, and to be effective only during the holiday season to relieve pre-holiday congestion. Stricter enforcement of present state and city traffic regulations is also suggested.

The commission also recommended that the police department rigidly enforce the existing loading zone ordinance, prohibit the parking of vehicles in the second line of traffic and use its full authority to facilitate the free movement of street cars wherever police officers are available.

It recommends further that the Los Angeles Railway and Pacific Electric Railway be authorized to paint yellow lines on the street sufaces wherever desirable parallel to the outside street tracks 4 ft. from the outside rails. This color is suggested in order that the lines will not be confused with the white lines used in marking the loading zones.

The Traffic Commission offers to aid the Los Angeles City Council in any capacity it may determine to relieve what is termed to be an unusual condition in traffic congestion.

Special Theater Fare Rates Made by Indiana Interurban

It has been announced by the Indianapolis & Cincinnati Traction Company that very low round-trip rates will be made during December for the benefit of patrons attending Indianapolis theaters in the evening. The new reduced fare will be good only on evening trains. It is expected that this plan will develop additional business on trains that are usually operated at a loss. It is understood that if the theater fare arrangement proves popular it may be made a permanent feature of the I. & C. service.

One-Man Car Case Before the Wisconsin Supreme Court

The one-man car situation in Milwaukee is expected to be drawn to a head on Dec. 14. On that day the Wisconsin Supreme Court will hear and consider the appeal of the city attorney of Milwaukee charging that the Wisconsin Railroad Commission exceeded its authority when it granted permission to the Milwaukee Electric Railway & Light Company for the operation of one-man cars in Milwaukee. The city contends that the State Legislature never conferred on the commission power to approve the operation of one-man cars in Milwaukee.

The city attorney says that operation of one-man cars in Milwaukee is contrary to a city ordinance. The contention of the city attorney that cars must be run with two men was not upheld by the Dane County Circuit Court, Madison. That court ruled that the Railroad Commission did have jurisdiction over the operation of these cars in Wisconsin cities, and it is from this decision that the attorney for Milwaukee is appealing to the Wisconsin Supreme Court.

Plush Seats in New Chicago "L" Cars

Several trains of the new steel cars recently received by the Chicago "L" were placed in service Dec. 2 on the various branches of the Chicago Elevated System. Shipments of these cars from the plant of the Cincinnati Car Company to date total 75 out of the 102 ordered. The cars are similar in construction to the company's 1914 design of steel cars with the exception that the center side door has been eliminated.

The interior has been equipped with a view particularly toward supplying passenger comfort and attractive appearance. Green plush upholstered cross seats, white maple grooved floor, shaded side and center lights, and oscillating fans at either end are some of the interior features.

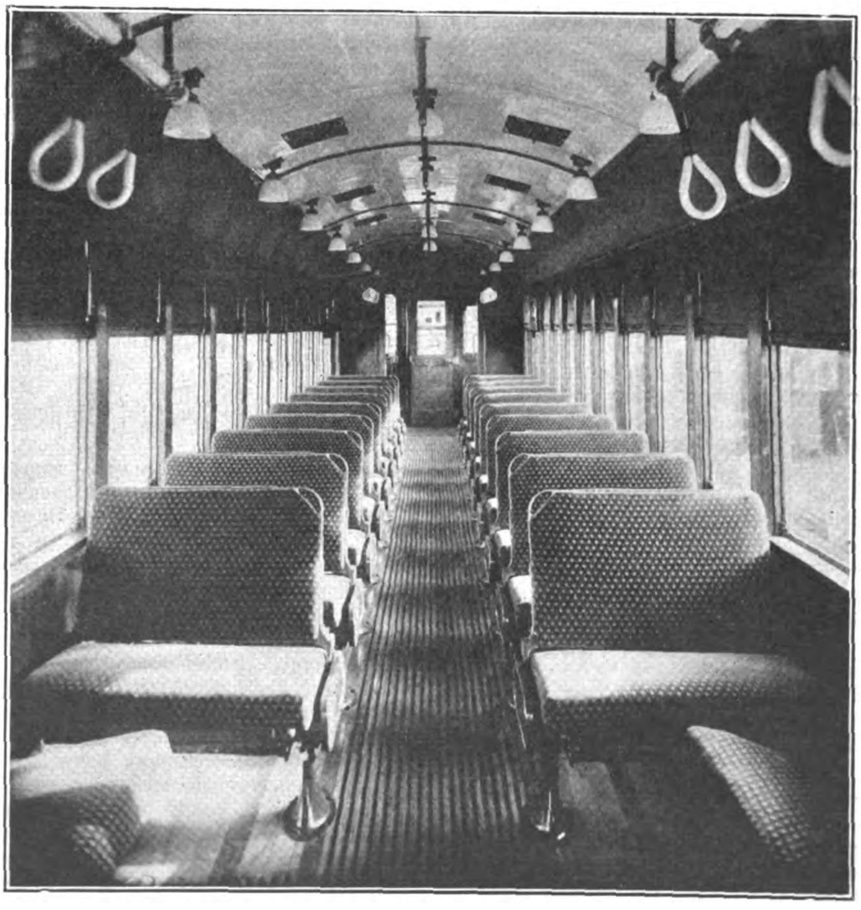
Electro-pneumatically operated sliding doors, with automatic interlock switches inclosed in the rubber bumper, have been provided at the ends of the car. Control switches for operating these doors are mounted on the outside of the dash at each end of the car and so arranged that the guard may open the doors at both ends of the cars.

All the new cars will be motor cars with two motors on each car, both located on one truck. The motor truck has a wheelbase 12 in. longer than that of the dead truck.

Following out the plan which originated some months ago, the new cars are painted orange above the belt rail and a brilliant green below the belt rail, with the sash and doors also painted green.

PRINCIPAL DIMENSIONS OF NEW CHICAGO "L" CAR

Length over bumpers	48 ft. 0 in.
Width over drip rails	8 ft. 10 7/16 in.
Height, top rail to top roof, light	12 ft. 3½ in.
Truck centers	33 ft. 8 in.
Wheel base of trucks (trailer end)	5 ft. 6 in.
Wheel base of trucks (motor end)	6 ft. 6 in.
Wheel diameter	34 in.
Seating capacity	48
Door width	3 ft. 8 in.
Aisle width	21¾ in.
End wall width between longitudinal seats	4 ft. 0¼ in.
Seat width	40 in.
Seat spacing	2 ft. 8½ in.



More Comfort and Attractiveness Are Features of New Chicago "L" Cars

Ten Cents Cash Asked

Atlanta Company Says It Can't Continue Under Present Conditions—Wants Jitneys Curtailed

An increase in single cash fares from 7 to 10 cents is being sought by the Georgia Railway & Power Company, tickets to remain at their present price of 6¼ cents each if bought in strips. The company desires to charge 2 cents for transfers. It wants jitneys eliminated from st ee s way now operates and desires to do away with unnecessary car stops. These are some of the things requested in a petition filed by the company with the Atlanta City Council, on Dec. 1.

The petition states:

> If present conditions continue, there will shortly be no margin of profit left to the company after operating expenses have been paid, and the ability of the railway to maintain the present transportation service will be ended—a condition which has never before existed in Atlanta, but which can be prevented by the plan submitted in this petition.
>
> Already the credit of the railway is exhausted and not one dollar of additional capital can be borrowed either for the purpose of improving existing mileage or for making extensions.
>
> The railway business can be put on a living basis by increasing the number of passengers carried, by lessening the cost of operation, or by increasing the fare per passenger.
>
> As we cannot increase the number of passengers carried or decrease the cost of operation, the only thing left to do is to increase the fares.
>
> *Jitney competition* is unfair. If continued it will subject the railway to such losses that it will be forced to discontinue operation. Jitneys should not be licensed except where the necessity for them is shown.
>
> Ten cents cash fare is asked because the cost of furnishing railway service has more than doubled since 1914. Car riders will pay no increase in fare if they buy tickets.
>
> A 2-cent charge for transfers is asked because the cost of furnishing service has more than doubled.
>
> No service should be furnished free. Free service can only be given at the expense of those who pay the fares.
>
> The management should be vested with reasonable authority in eliminating unnecessary car stops. The car stops in Atlanta are unnecessarily frequent and prevent quick, reliable service as well as increase the cost of the service.

The petition also asks the removal of all the indirect and special taxes assessed against the railway and its property, declaring that these taxes must ultimately be levied against the passengers, since the only money received by the company with which to pay taxes comes from the fares received by its passengers.

It asks that railway property in Atlanta be taxed only on an equal basis with other classes of property in the city.

The petition closes with the statement that the company is interested only in making a reasonable profit on its investment, and in rendering the best service possible to the people of Atlanta.

Indiana Interurbans to Use Buses

Extensive operation of buses is being planned by electric railways in Indiana to meet competition from lines independent of the railways. The Interstate Public Service Company and the Indianapolis & Cincinnati Traction Company are operating buses now as feeders and the present bus systems will be extended. As noted elsewhere in this issue the I. & C. has closed a contract for bus service to connect Versailles, Osgood and Greensburg, to be operated in conjunction with the traction lines. Several bus lines now carry passengers from small towns and farms to the cities and stations of the Interstate Public Service.

Buses May Have to Be Withdrawn in Louisville

James P. Barnes, president of the Kentucky Carriers, Inc., Louisville, Ky., subsidiary of the Louisville Railway, stated on Nov. 30 that the present city bus service would probably be abandoned unless the public supports the local lines better. At the present time the bus service is not earning more than 60 per cent of operating costs, and very little improvement has been shown in earnings since the recent change in the operating schedules. The fact that the idea of service by bus is new and that the public has not become accustomed to the service are regarded as partly responsible for lack of patronage.

Flood at Oklahoma City Causes Influx of Jitneys

Jitney competition menaces the Oklahoma Railway. Following the destruction by flood of the bridge and a half mile of fill on the right-of-way between Oklahoma City proper and the section of the city known as Capitol Hill, city and Norman interurban cars had to be rerouted via Packingtown. This involved serious delay to traffic and automobiles began carrying passengers between Capitol Hill and the city for 10 cents. The railway facilities were restored with the opening of the new bridge over the North Canadian on Dec. 3, but the city attorney announces that there is no legal barrier on the ordinance books of the city preventing the operation of jitneys.

Will Establish Safety Zones.—The Trenton-Mercer County Traction Corporation, Trenton, N. J., will establish safety zones and mark trolley stops with lights along part of Pennington Road.

Enforcement of Ordinance Against One-Man Cars Postponed.—A measure approved by the electorate of Dayton, Ohio, early this fall, placed in immediate effectiveness theoretically, a ban on the one-man car. Jan. 1 is the date tentatively set by the city for enforcing the measure, but in the event the companies cannot make the physical changes in their property by this time, it has been indicated that the date will be extended. Indications are said to point to an arrangement being made which will permit the cars to remain in service under conditions of street traffic more favorable than those that now exist.

Higher Rates Sought.—The United Electric Railways, Providence, R. I., has applied to the Rhode Island Public Utilities Commission for permission to raise its fares so as to give nine rides for 50 cents. The rate at present is ten rides for 50 cents. Single fares are to remain at 6 cents. The reason given by the company in its request for increased rates was that receipts were running behind operating expenses.

"Transportation" Appears.—The National Transportation Institute is publishing, each Tuesday, a new pamphlet, entitled "Transportation." In its relation to all industries, the subject of transportation is covered in detail in this sheet. Number 4 of Vol. 1 tells what the National Transportation Institute really is. It explains in an editorial that the institute represents the business men's solution of the transportation problems of the United States. Further, that its purpose is to aid the public in understanding the business problems of transportation, in order that growth of agriculture and industry may continue. The paper is dated Chicago.

Bus Operation Started.—Operation of its first auxiliary motor bus line was started Nov. 6 by the Springfield Railway, Springfield, Ohio, the bus operating in Melrose addition and connecting with the Yellow Springs Street cars. Service will be extended by the company if found desirable after the tentative schedule has been given a trial.

Provisions Made for First Class Mail.—First class mail out of Salt Lake City will be carried into Provo by the Orem Electric Railroad within a short time. Arrangements are now being made looking toward converting the interurban into a mail carrier road.

Saving Time in Evening Rush.—The Grand Rapids Railway, in order to speed up accommodations during the evening rush, has ruled that no fares shall be collected from patrons on entering outbound one-man cars. It is said much time is saved and traffic does not pile up in the downtown section if patrons are hurried directly into the cars during the rush hour. Fares are paid as patrons leave.

First Cattle Cars Moved.—The first electric-way shipment of livestock from Louisville to Indiana markets by means of the new tracks of the Interstate Public Service Company, entering directly into the Bourbon Stock Yards in East Louisville, was consigned on Nov. 12. On that date an electric locomotive pulled out of the yards with three cars of cattle for Indianapolis and three destined for Frankfort, Ind. The six cars contained an average of thirty head of cattle each. The rates, it is said, will be about on a par with railroad transportation charges, but delivery is speedier due to direct movement and elimination of loss of time by switching.

Railway Explains.—The Louisville Railway is running a series of advertisements in the Louisville newspapers in an effort to explain to the public just why the company is not always able to serve its patrons as it would like to serve them.

Certificate Refused. — Because adequate freight service is being given over the route from Oklahoma City to El Reno and Geary, the Oklahoma Corporation Commission refused to grant a certificate of convenience and necessity to the Highway Transfer Company to operate motor car freight lines. One of the objectors to the granting of this certificate was the Oklahoma Railway, That company contended its own lines had established stops about every half mile where freight was received and discharged. The order became effective Nov. 21, 1923.

Bus Contract Helps Service.—Interurban facilities of the Indianapolis & Cincinnati Traction Company have been extended by the closing of a contract for bus service in Versailles, Osgood and Greensburg. An announcement of this service was made by Hudson R. Biery, assistant to President Henry.

Company Shows Its Progress.—The Galveston Electric Company, in an advertisement in the annual trade edition of the Galveston *Daily News*, presented "The Old and the New" in railway operation in Galveston. Two pictures were reproduced. One showed the old-time mule car, while the other showed one of the new one-man safety cars recently put in use in Galveston. The aims and ideals of the traction company are then set forth briefly by R. G. Carroll, local manager at Galveston.

Increased Fares Sought.—The Hannibal Railway & Electric Company, Hannibal, Mo., has filed an application for increased fares with the Missouri Public Service Commission. A hearing on the petition will be held in Jefferson City, Mo., on Dec. 11. The company estimates the increase would net it approximately $1,800 a year. Increased cost of labor and materials is given as the reason for the application.

Traffic Model Will Tell Story.—The Springfield, Mass., Police Department has introduced an adjustable traffic model which is recommended by the American Automobile Association for adoption by courts throughout the country in trying cases arising from street accidents. An improved form of this model was used at an inquest in Springfield recently for the first time. It is provided with miniature street cars, tracks, poles, wires, hydrants, trees, automobiles, vehicles and pedestrians, which can be so placed as to illustrate any kind of street accident. The model is 3 ft. long by 20 in. wide and rests on a wooden base. It has movable sidewalks and intersecting streets. To show an accident on a street without street car lines a metal covering is made to fit over the tracks. Policemen are instructed in the case of every accident to secure the measurements in order to show correctly to the judge and jury the relative positions of the various parties and factors concerned. It has been found that the use of the model saves time and expense in trying cases, particularly as its use does away with the need for special drawings.

Legal Notes

ALABAMA—*Waiting Passengers Include Others Than Those Who Signal the Car to Stop.*

Where an interurban car stops to receive passengers the invitation to board the car is not limited to those who signaled for the car to stop. Hence, a person attempting to board the car at such a point and having his hand injured when the door was being closed has cause for action. [Mobile Light & R. Co. vs. Ellis, 96 Southern Rep., 773.]

INDIANA—*Jury Qualified to Pass on Adequate Bonding.*

Where plaintiff's horse ran away while crossing a railroad, claimed due to an electric shock, an instruction that the jury, in determining whether the bonding of defendant's rails was defective and whether there was a leakage of electrical current, should consider whether the earth near the crossing was charged with electricity and whether the electric current would leak from the rails if the bonding was in good condition, and whether other horses suffered an electric shock at the crossing under similar circumstances, and whether electric sparks or flashes were seen at the joints of the rails at the crossing, and, if so, whether that indicated defective bonding, in so far as those matters were shown in evidence together with all the other evidence upon the question *held* not reversible error under the evidence. [Indianapolis & Cincinnati Traction Co. vs. Montfort, 139 Northeast Rep., 677.]

KENTUCKY—*Third-class City Cannot Grant Franchise Without Requiring Company to Pave Between Tracks.*

The limitation of Ky. St. Sec. 3290, upon the power of third-class cities in granting street railway franchises which prohibits such franchise without requiring the company to pave between the tracks, is mandatory. Hence a franchise granted without such requirement, either expressed or implied, would be void. The provisions of Sec. 3450, relating to the assessment of such cost where the payment is required by the franchise, applies whether the requirement is expressed or implied. [City of Henderson vs. Henderson Traction Co., 254 Southwest Rep., 332.]

MISSOURI—*Penal Statute Held Not to Deny Equal Protection or Due Process.*

Rev. St. 1909, Art. 5425, providing that, when any person shall die from injury resulting from negligence in running any car or train, the corporation shall forfeit and pay as a penalty the sum of not less than $2,000 and not exceeding $10,000, construed as wholly penal and as authorizing recovery of maximum amount, though there is no pecuniary loss, does not deprive railway company of equal protection of the laws, or due process of law, in violation of Const. U. S. Amend. 14. [Grier vs. Kansas City, C. C. & St. J. Ry. Co., 254 Southwest. Rep., 359.]

NEW YORK—*That Car in Collision Was of the One-man Type Held Properly Commented On.*

In an action against the railway company for damages, it was proper for plaintiff's counsel to call the attention of the jury to the fact that the car concerned in the collision was of the one-man type and to point out the duties of the operator in a car of the type used, although there was no contention that the failure to have a conductor on the car was a proximate cause of the accident. [Christman vs. Union Railway, 200 New York Sup., 800.]

OHIO—*Commission Authorized to Deny Application for Issuance of Securities Based on Overvaluation.*

Under Gen. Code, Secs. 614-53 to 614-55, authorizing the Public Utilities Commission to supervise the issue of securities by utilities and railroads, such commission is authorized to deny an application for the issuance of securities based upon an overvaluation, or upon which a fair return may not be probably realized or reasonably expected. [Lima Toledo R. Co. vs. Public Utilities Commission, 140 Northeast. Rep., 603.]

PENNSYLVANIA—*Obligation to Maintain Paving Not Removed by Offer to Surrender Right-of-Way on Street.*

A street railway company is not relieved of obligation, assumed as condition of right to occupy a street, to repair the street because of its receipts being reduced by a subsequent grant by the borough to another company to occupy a parallel street and by another company with which it had had connection passing into the hands of another at foreclosure sale. It is also not relieved of its obligation by an offer to surrender its right on the street and remove the tracks, though it cannot be compelled to continue indefinitely operations at a loss. If it desires to surrender all its powers and franchises and cease its corporate existence, it may make application under P. L. 293; Pa. St. 1920, sec. 5791. If it merely desires to abandon part of its line, thereby affecting service, the determination of the question is for the Public Service Commission, to which is committed the regulation of service. [Borough of Norristown vs. Reading Transit & Lt. Co., 121 Atlantic Rep., 495.]

New Publications

Workmen's Compensation Legislation of United States and Canada—1920-1922

Bulletin No. 332 of the United States Bureau of Labor Statistics, Workmen's Insurance and Compensation Series. Government Printing Office, Washington, 1923.

This bulletin gives a summary of legislation in force on the subject of compensation, which has been enacted in the years covered, followed by an appendix giving the exact text of all laws passed, or of amendments to previously existing laws. It is issued strictly as a supplement to an earlier bulletin, No. 272, which covered the legislation in force at the end of the calendar year 1919.

Ball Test Applied to Cement Mortar and Concrete

By R. E. Crepps and R. E. Mills. Bulletin No. 12 of the Engineering Experiment Station at Purdue University. Published by Purdue University, Lafayette, Ind.

This bulletin describes a method of testing concrete, particularly for highway construction, by means of a steel ball in a manner similar to the Brinell method of testing, which has been generally accepted as a reliable index of the mechanical properties of steel. According to the authors, the ball test affords a valuable and convenient means of determining the compressive strength, provides a reliable index of strength for any age or mix, allows material in place to be tested and provides a new means of studying questions in connection with concrete pavements. Such questions include the effect of wheel loads upon surface strength, the effects of different types of tires upon surface strength, the effect of tire inflation upon surface strength, the distribution of damage on any area of contact, the effect of impact and the recovery of surface strength. Methods of making the test and the procedure involved are described.

Workmen's Compensation Acts in the United States—The Medical Aspect

Research Report No. 61 of the National Industrial Conference Board, New York City. 282 pages.

This volume is a discussion of the medical side of workmen's compensation. The importance of the questions on this subject has been emphasized largely by the inclusion of diseases of occupations in later revisions of compensation laws, and also by the granting of compensation for diseases having only a casual and sometimes remote connection with the occupation or with the original injury. The needed medical experience is now available in the records of decisions of industrial boards and commissions and of the courts. These decisions have been carefully studied by the National Industrial Conference Board and the principles and practices developed have been analyzed in this report. Various types of injury and diseases resulting from accidents are treated in detail. In connection with the study, reference is made to some 800 reported cases.

Personal Items

Samuel Rea Elected President of Long Island Railroad

The board of directors of the Long Island Railroad elected on Dec. 5 Samuel Rea as president of the company, to succeed Ralph Peters, deceased. This is in accordance with the policy that has been pursued on the Pennsylvania Railroad System for several years, that the president of the Pennsylvania Railroad Company shall also act as president of the principal companies in the system.

George LeBoutillier continues as the vice-president of the company, resident in New York, in special charge of the operations of the road and all questions relating to its improvement and service, and of the various departments dealing with all features of the company's operations, except finance and accounting. These latter features are under the supervision of the vice-presidents at Philadelphia, as was the case during Mr. Peters' administration.

C. J. Quill has been appointed to the position of transportation salesman of the Tacoma Railway & Power Company, Tacoma, Wash.

Walter A. Shaw has been appointed by Mayor Dever as the city representative on the Board of Supervising Engineers, Chicago Traction, and his appointment approved by the City Council. Mr. Shaw was formerly engineer of the Illinois Public Utilities Commission, later acting in the capacity of consulting engineer for the city of Chicago and more recently as advisory engineer to the Lincoln Park Board.

Samuel T. MacQuarrie has been appointed director of the New England Bureau of Public Service Information, with headquarters at 24 Milk Street, Boston, Mass. Mr. MacQuarrie has been associated with the banking house of Curtis & Sanger, Boston, and for about twenty years was employed by the Fore River Shipbuilding Corporation at Quincy, Mass., and later by the succeeding Bethlehem Shipbuilding Corporation, Ltd., as assistant to the works manager, and in charge of publicity prior to the Bethlehem acquisition. He succeeds Joseph B. Groce who has joined the staff of the Edison Electric Illuminating Company, Boston.

Frederick Rollins Low, since 1888 editor of *Power*, a McGraw-Hill publication, was inducted as president of the American Society of Mechanical Engineers at the convention held in New York during the week ended Dec. 8. Mr. Low has been active in the affairs of the American Society of Mechanical Engineers since becoming a member in 1886. He served as vice-president of the society in 1918. He will be the delegate of the association to the World Power Conference in London.

Joseph A. Whitlow, formerly connected with the Pine Bluff Company, Pine Bluff, Ark., and superintendent of the Alapco division, has been appointed manager of the Tulsa properties of the Public Service Company of Oklahoma. Mr. Whitlow went to Alapco early in 1919, succeeding the late Minor Q. Woodward with the Pine Bluff Company. His resignation became effective on Dec. 1.

William C. Wheeler has been appointed engineer of equipment Chicago Surface Lines, succeeding Charles Gordon, who resigned some months ago to become Western editor ELECTRIC RAILWAY JOURNAL. For the past two and one-half years Mr. Wheeler has been employed in the railway motor engineering department of the General Electric Company at Schenectady. He is a graduate of the school of engineering, University of Missouri, and has done considerable work in the shops of street railway companies and the Union Pacific Railroad at Sedalia, Mo.

J. L. Longino, vice-president and general manager of the Arkansas Light & Power Company, was recently elected president of the Arkansas Utilities Association at its sixteenth annual convention. It was early in the current year that Mr. Longino was made vice-president and general manager of the Arkansas property, advancing to that position from the one of operating superintendent. Two years prior to this he had been made manager of the Pine Bluff Company, an associated public utility which operates the electric railway, power and water services in Pine Bluff. His promotion of this year did not alter his association with the Pine Bluff Company as general manager, although he was relieved of some duties by L. B. West, auditor of the company.

Obituary

William H. Burk, secretary, treasurer and auditor of the Waterloo, Cedar Falls & Northern Railway, died suddenly at his home in Waterloo, Iowa, recently. He had been ill for the past two years. Mr. Burk was connected with the Chicago Great Western for some time, being general Eastern agent in New York City before going to Waterloo twelve years ago.

Alex G. Drury, Jr., nationally known mechanical and electrical engineer, died at his home in Cincinnati on Nov. 29. For the past ten years Mr. Drury had been engineer for the Cincinnati, Newport & Covington Light & Traction Company, which leases the electric railway systems in Covington and Newport, Ky., to the Cincinnati, Newport & Covington Street Railway, a subsidiary of the Columbia Gas & Electric Company. He was thirty-eight years old.

So states Dr. P. G. Agnew, secretary of the American Engineering Standards Committee, in a bulletin which he has prepared for the committee.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Much Welding Being Done

Manufacturer Reports Substantial Increase in Use of Thermit Process

Tangible evidence is at hand that track reconstruction work has continued at a fast pace during the year now drawing to a close. It will be recalled that more miles of track were rebuilt during 1922 than in any year previously recorded. The complete figures for 1923 will not be available for several weeks, but the pace that has been set is indicated from sources other than the railways themselves.

Among the manufacturers of track material reporting very satisfactory business this year is the Metal & Thermit Corporation. Its railway business has been 50 per cent greater this year than the best year. Not only this, but the company reports a substantial increase in the number of customers. To be more nearly exact, it had on its books this year three times as many customers as last year.

This expansion is attributed by the company to two things: (a) the constantly growing appreciation of the value of the Thermit rail weld and (b) the reduction in cost of installation through economies effected in carrying out the process. This cost, the company now reports, has been so reduced that it compares favorably with any other method of joining rails.

Perhaps the biggest order of the company has been for material for from 5,500 to 6,000 joints. This, by the way, was from a company still in receivership. This simply reflects again that the electric railways are rehabitating strongly, even where the company may be in receivership.

Another large order received by the company was for material for about 5,000 joints. These, of course, are some of the outstanding installations. Orders for material from 1,000 to 3,000 joints have been plentiful.

The Metal & Thermit Corporation is more than optimistic about the prospects for business in the electric railway field in 1924. Its business, in this field is, of course, only a small part of the entire output of the company. In other lines, notably steam railway work, it also reports a substantial growth in business.

New Radial Line in Toronto in Prospect

The first spike was driven recently on the track to be laid by the Toronto Eastern Railway which was the initial step in the operation of a new radial line running from Bowmanville to Toronto. It is expected that the line will be in operation by the end of next summer. Construction of the line was started in 1914. At that time the work was begun by the Canadian Northern Railway, but will be finished by the Canadian National Railways. When the war came construction activity ceased, but since that time Canadian National engineers have been occupied with working out the completion of the project. Originally tracks on the proposed radial were laid from Bowmanville to Whitby and grading on the right of way was completed from Whitby to Pickering, but the rails on the latter part were not laid. About a year ago Sir Henry Thornton, president of the Canadian National Railways, announced that he would have the road extended to Toronto and operated as a fast electric railway. Many distinguished people, including railway officials, were present at the ceremony of commencing the new rails.

Standardization Being Accomplished by Germans

The extent to which industrial life in Germany has been coordinated, it is said, is shown by the fact that more than 700 German national standards have been adopted. In addition to the work of the central body there are no less than sixty-five special industry committees actively working on such subjects ranging from the standardization of pipe fittings to sheet paving material and railway car construction.

A striking example is cited of the efficiency of national standardization as it has been developed in Germany in the case of a rush order placed with German manufacturers for 200 locomotives for delivery to Russia. Production of different parts was allotted to seventeen different manufacturers to be produced strictly upon the plan of interchangeable parts, no one manufacturer making a complete locomotive. No serious practical difficulty was encountered in filling the order. The inspectors made a particularly striking test of the feasibility and accuracy of the plan by ordering a complete locomotive to be assembled from parts chosen at random from the parts furnished by the seventeen manufacturers. It proved to be ready for service immediately after assembly without the necessity of any disassembling for readjustment.

"The extent to which Germany has so far succeeded in keeping her industrial machine intact is due in no small part to the elaborate scale on which her standardization work is performed."

Brill Declares Dividend

A disbursement of 1¾ per cent was made on the common stock of the J. G. Brill Company on Dec. 1. The amount of outstanding common stock is $4,810,000, on which there were no dividends paid from 1908 until March 1, 1923, when a disbursement of 1¾ per cent was made. This dividend has been paid quarterly since. The price range of the common stock has been as follows:

	High	Low
1917	33	10
1918	27	18
1919	64¾	19½
1920	63	24
1921	56	25
1922	59	36
1923	91	49

This year the company has had good business, the direct result of increased purchases by public utility companies.

Lumber Conference Reaches Conclusions

It is expected that trade in lumber products in various countries will be facilitated following the recent European Lumber Conference held in Bratislava. At the conference it was decided to establish a permanent European commission, composed chiefly of reputable lumber exporters, to which would be assigned the task of establishing a lumber trade Court of Arbitration. In the case of dispute and on appeal by both parties this court would render decisions which would be final and binding. A second decision of the conference contemplates the formation of a European association to be composed of the various European lumber trade associations. The conference considered also the matter of standardization of lumber sizes and classification, but took no definite action in this direction. Besides the Czech delegation there were present representatives from France, Italy, Austria, Germany, Holland, Switzerland, Hungary and Rumania.

Metal, Coal and Material Prices

Metals—New York	**Dec. 4, 1923**
Copper, electrolytic, cents per lb.	13.125
Copper wire base, cents per lb.	15.50
Lead, cents per lb.	7.00
Zinc, cents per lb.	6.70
Tin, Straits, cents per lb.	47.00
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.625
Somerset mine run, Boston, net tons	2.125
Pittsburgh mine run, Pittsburgh, net tons	2.00
Franklin, Ill., screenings, Chicago, net tons	1.575
Central, Ill., screenings, Chicago, net tons	1.35
Kansas screenings, Kansas City, net tons	2.00
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$6.65
Weatherproof wire base, N. Y., cents per lb.	17.00
Cement, Chicago net prices, without bags	$2.10
Linseed oil (5-bbl. lots), N. Y., per gal.	$0.95
White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots	11.25
Turpentine, (bbl. lots), N. Y., per gal.	$0.93

Victorian Railways Invite Bids

The Victorian Government Railways, Melbourne, Australia, is inviting bids on the following machinery and equipment: Spring coiling machine and necessary equipment, including electrical motive apparatus; paper rolling machine, including electrical motive apparatus; combination turret lathe, including leading screws and nuts and taper-turning attachment; gear-cutting machine; automatic cross-cut saw; cross grooving and trenching machine; planing and thicknessing machine, including side cutters. A copy of the specifications covering this equipment may be consulted by interested manufacturers at the Boston or New York district offices, or at the Cincinnati co-operative office. Bids will close at Melbourne on Jan. 9, 1924.

Rolling Stock

Fort William Electric Railway, Fort William, Ont., during 1923 remodeled two single-truck and one double-truck one-man cars.

West Chester Street Railway, West Chester, Pa., built and rebuilt in the railway shop during 1923 four interurban two-man cars.

New York, N. Y.—The department of Plant and Structures is considering the purchase of new cars to supplement present service on the Williamsburg Bridge and also to provide for other service that will likely be taken over by the city.

Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., during 1923 ordered two city double-truck two-man cars and one interurban two-man car.

Spokane United Railways rebuilt four one-man cars during 1923.

Salt Lake & Utah Railroad, Salt Lake City, rebuilt or remodeled during 1923 three insulated box cars, one tank car and one flat car.

Indiana County Street Railways, Indiana, Pa., ordered from the Kuhlman Car Company in 1923 three interurban double-truck two-man cars.

Northern Texas Traction Company, Fort Worth, during 1923 ordered from the American Car Company ten double-truck one-man cars. Twenty-two cars were remodeled, the Cincinnati Car Company remodeling twelve city motor double-truck one-man cars and the St. Louis Car Company rebuilding ten.

San Francisco, Napa & Calistoga Railway, Napa, Cal., during 1923 ordered from McGuire-Cummings one interurban steel locomotive double-truck car and one work car from the Pacific Car & Foundry Company.

Quebec Railway, Light & Power Company, Quebec, during 1923 ordered of the Ottawa Car Manufacturing Company, Ltd., ten single-truck one-man cars. Ten double-truck two-man cars were rebuilt.

Sacramento Northern, Railroad, Sacramento, Cal., ordered during 1923 two electric locomotives from the General Electric Company.

Worcester Consolidated Street Railway, Worcester, Mass., during 1923 ordered ten double-truck two-man cars for city service from the Osgood-Bradley Car Company.

Track and Line

Trenton & Mercer County Traction Corporation, Trenton, N. J., will remove its switcn on Brunswick Avenue to Harney's Corner in Lawrence Township.

Toronto Transportation Commission built in 1923 7.152 miles of new single track in pavement and rebuilt 7.774 miles.

Salt Lake & Utah Railroad, Salt Lake City, during 1923 increased its side tracks by 5,553 ft. of track none of which was in paved streets.

Alabama Power Company, Gadsden, Ala., will rebuild the Cansler Street line from Ninth Street to a point on Twelfth Street. Seventy-pound rail will replace the 40-lb. rail and the street occupied by the car line will be repaved. The Cansler Street improvement will cost from $12,000 to $15,000. Work is progressing on the rebuilding of the car line trestle over Black Creek on the Attalla line.

Wisconsin Public Service Corporation, Green Bay, Wis., rebuilt in 1923 2,500 ft. of city single track paved and raised to level with new ties and ballast.

Pittsburgh Railways built during 1923 0.467 miles of city single track and 0.025 miles of interurban track in pavement. In open construction there was built 0.171 miles of city track and 0.062 miles of interurban. The company rebuilt 34.326 miles of city track and 0.911 miles of interurban track in pavement and in open construction 1.028 city miles and 1.826 interurban miles.

St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., will extend the Wyatt Park line tracks 1,700 ft. on Thirty-third Street. An agreement to this effect was reached recently following a conference with the park board members and S. B. Irelan, general manager of the company.

Power Houses, Shops and Buildings

Sydney, Australia.—The railway commissioners are now receiving bids and placing orders for the power plant equipment, including a number of large turbo-generators and boilers for the electrification of the Sydney Suburban Railways. When installed the generating units will be the largest in Australia, each being of 20,000-kw. normal rating. It is expected that the electrification of the first section of the Suburban Railway system of Sydney will be completed by March, 1925.

Trade Notes

Morton Manufacturing Company, Chicago, manufacturers of the Acme line of railway appliances, has just completed an addition to its Chicago factory, giving it 18,000 sq.ft. of additional floor space.

Walter N. Ballou has been appointed manager of the transportation division of the Atlanta office of the Westinghouse Electric & Manufacturing Company. He will have charge of the light and heavy traction business of the company in that territory.

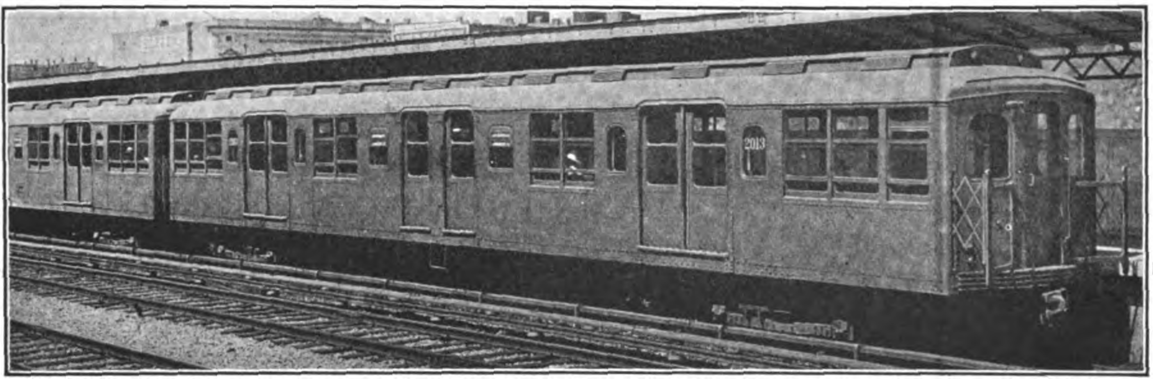
Western Electric Company, New York, N. Y., has announced important organization changes which involve the appointment of three new assistant works managers and two superintendents in the manufacturing department. These changes are part of a program of expansion being carried out in the new Western Electric works at Kearny, N. J., which in their ultimate development may duplicate the tremendous plant at Chicago. C. L. Rice, formerly production superintendent of the Hawthorne works at Chicago, and S. S. Holmes, general superintendent of installation of the installation department, have been promoted to assistant works managers at Hawthorne. R. C. Dodd, at present operating superintendent of the Hawthorne works at Chicago, has been promoted to assistant works manager at the new Kearny, N. J. works. This appointment is effective March 1, 1924. Other changes are as follows:

J. J. McKenna, formerly assistant general purchasing agent at Hawthorne, succeeds Mr. Rice as superintendent of production and W. H. Meese, supervisor of installation methods and results, succeeds Mr. Dodd as operating superintendent at Hawthorne.

New Advertising Literature

Linde Air Products Company, New York, N. Y., has just published an illustrated booklet of 122 pages fully describing the latest methods for various kinds of work. It states that the keynote of successful cast-iron welding is a thorough understanding of the necessity for adequate preheating, proper welding practices and suitable annealing. In many shops the application of advanced methods has accomplished saving in money, labor and time.

Ohio Brass Company, Mansfield, Ohio, has issued a pamphlet called "How to Save Time, Money and Temper!" "Cam yourself, Bill, cam yourself" tells about the advantages of using cam tips. These cam tips can be found not only on frogs but on Ohio Brass crossings, section insulators, strain plates, etc. The circular says that you can "cam up" your whole system, save time, money and temper and have all the cars rolling all the time.



Rapid Transit — Safe Transit

The huge subway cars of the New York Municipal Railway, each of which usually carries well over a hundred passengers, annihilating space at fifty miles an hour, are equipped with every kind of emergency safety device. These include—

PEACOCK

Improved Brakes

Specified by Engineers

It is no mere coincidence that Peacock Brakes are almost always found on rolling stock which has been designed under the independent direction of technical and engineering experts.

Such men do not specify brakes on guess work or some one's else say so; they figure the braking forces necessary to stop a car from maximum speed in the shortest possible distance—in other words the maximum braking force which the wheels will take without skidding. Then they specify brake equipment which is designed to accomplish this result.

That means the Peacock Brake.

Peacock Improved 12-52

The 12-52 gear ratio Peacock hand brake is the one with ample braking power for the heaviest city, interurban and rapid transit cars.

There is a proper size and type of Peacock Brake for every type of car and class of service.

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STONE & WEBSTER
Incorporated
EXAMINATIONS REPORTS APPRAISALS
ON
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES
NEW YORK BOSTON CHICAGO

SANDERSON & PORTER
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ELECTRIC RAILWAY ENGINEER
WORCESTER, MASSACHUSETTS
REPORTS—APPRAISALS—RATES—OPERATION—SERVICE

STEVENS & WOOD, INC.
Design and Construction of Power Stations
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WRITE FOR OUR NEW DESCRIPTIVE CATALOG
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When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

Free Holiday Stamping Offer

Until January 1, 1924 we will stamp your name, or a friend's name, in gold on the front cover of the Standard Handbook for Electrical Engineers. Remittances should accompany orders and books stamped are, of course, not returnable.

This is not merely a chance to get a book with your name stamped on it. It is rather an opportunity to get a book that you need—a book so helpful—so handy—so valuable that you will want it to be made your own in this way.

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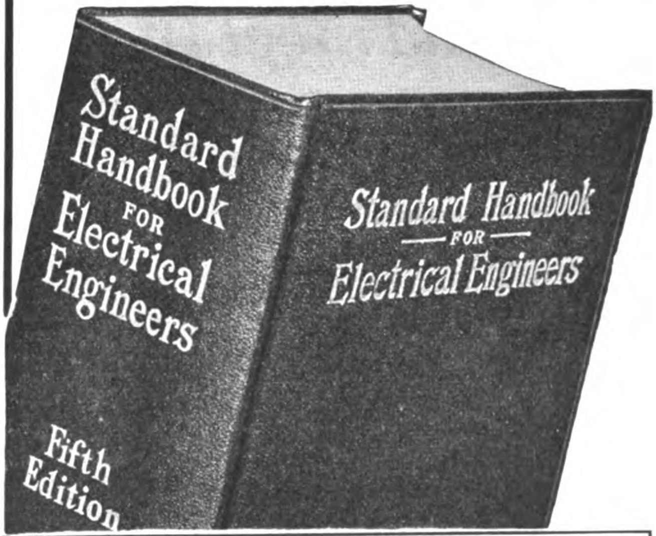
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How the Dayton

②

The 1923 Committee on Way Matters of the A.E.R.A. reported at the Atlantic City convention as follows:

"It was agreed that a substitute tie should meet the following requirements:

1. Resiliency. →	The fundamental principle of the **DAYTON RESILIENT TIE.**
2. Hold rail to gage. →	Held securely by bolts accurately located in steel cross members.
3. Provide sufficient bearing area. →	By protecting the concrete from breaking or pulverizing, the Dayton Tie converts the entire roadbed into bearing surface.
4. If expected to last for more than one set of rails, that easily renewable fastenings be provided. →	Readily accessible bolt fastenings provide for rail renewal.
5. Be easily installed by ordinary track workers. →	Eight ordinary track laborers, by actual test, have laid 1,000 feet of Dayton Resilient track in a single day.
6. Cost installed should be reasonable." →	Dayton Resilient Tie Track costs $2,000 per mile less than wood ties in gravel ballast.

DAYTON

"Holds the Rails to Gage"

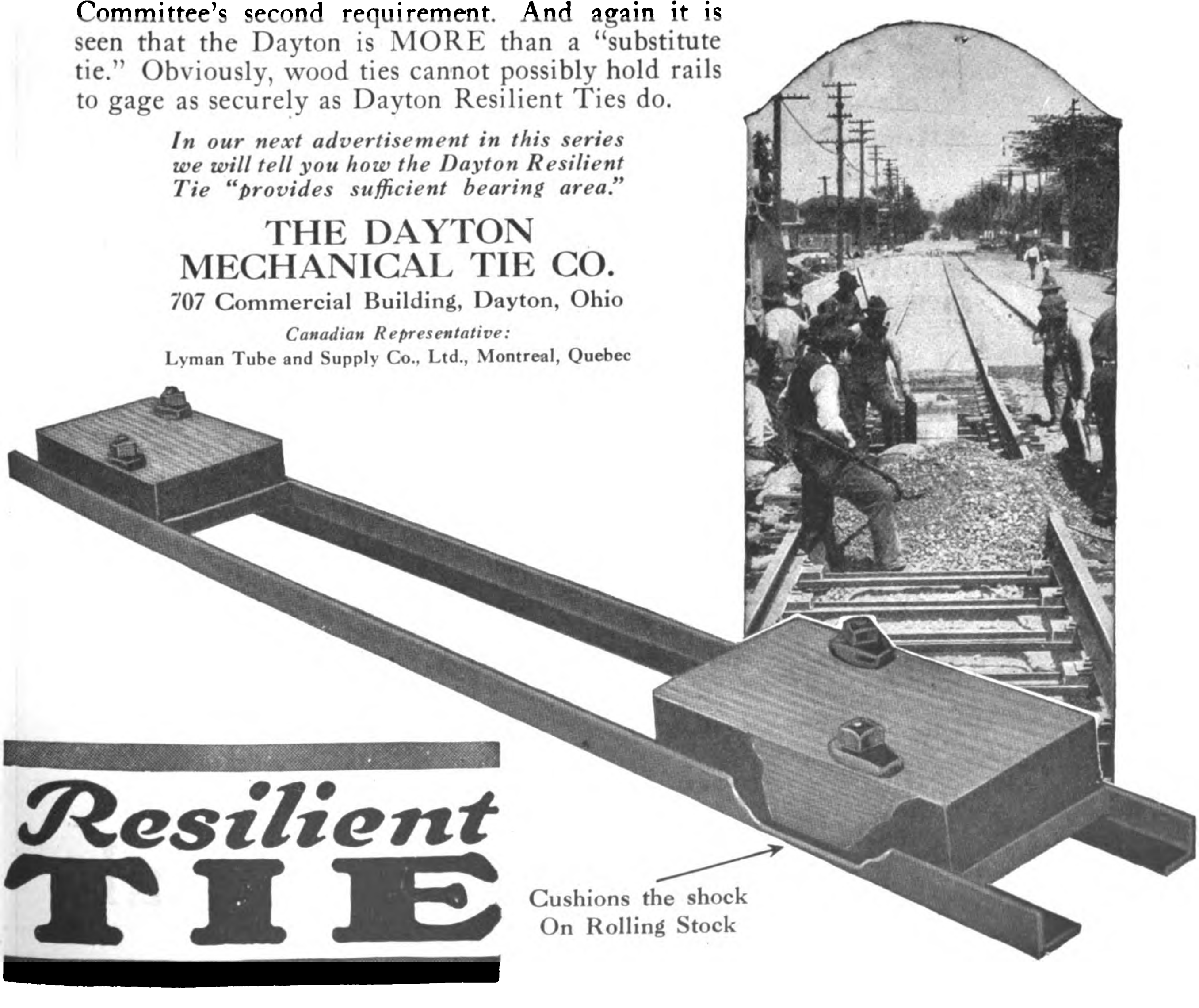
The second requirement that a "substitute tie" should meet, says the Way Committee, is this: "Hold the rail to gage."

With the Dayton Resilient Tie the rails are held securely to gage by bolts accurately located in steel cross members. There are no spikes to loosen under the side thrust of traffic. The sway of rolling stock, which ordinarily tends to pull the spikes and spread the rails, actually binds the rails tighter to Dayton Resilient Ties and holds the track to even gage.

Thus does the Dayton Resilient Tie meet the Way Committee's second requirement. And again it is seen that the Dayton is MORE than a "substitute tie." Obviously, wood ties cannot possibly hold rails to gage as securely as Dayton Resilient Ties do.

In our next advertisement in this series we will tell you how the Dayton Resilient Tie "provides sufficient bearing area."

**THE DAYTON
MECHANICAL TIE CO.**
707 Commercial Building, Dayton, Ohio
Canadian Representative:
Lyman Tube and Supply Co., Ltd., Montreal, Quebec



Cushions the shock
On Rolling Stock

**Resilient
TIE**

Carry On!

Buying power of Electric railways practically doubled during 1923.

* * *

The extent of this recovery will be shown in the facts and figures in the Annual Statistical and Forecast Number, January 5.

* * *

Where the industry is headed and what may be expected in the coming year plus vital facts not available through any other source are part of this important number.

* * *

Every thinking electric railway executive knows and uses *Electric Railway Journal's* Annual Statistical Number. He studies it from cover to cover, and refers to it from week to week throughout the year.

* * *

He knows from years of experience that he will find in this issue the facts he needs—facts in the text and facts in the ads.

* * *

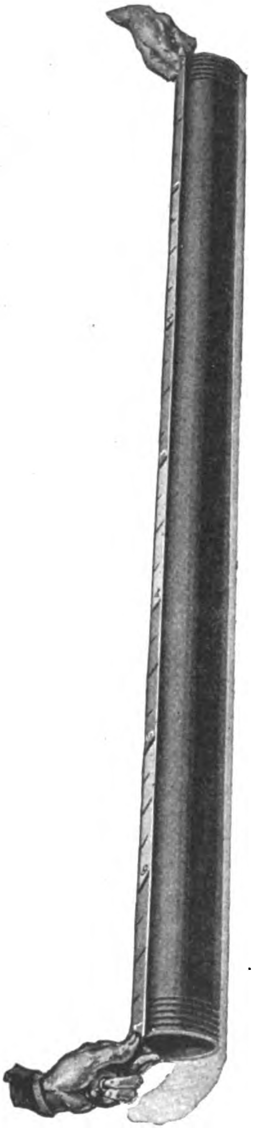
Because readers rely on the advertising section of the *Journal* as much as they do on the text pages, the Annual Statistical Number has become virtually a combined catalog for the leading manufacturers in the electric railway field.

Get the benefit of an early start for another big year of railway business

Address your 1924 Sales Message to this live, prosperous buying industry.
Start with the big New Year issue.
Write or wire your reservation.

Electric Railway Journal

Tenth Avenue at 36th Street, New York



Straight

You can be sure that every length of Bermico Fibre Conduit is made straight "as an arrow." (Bends and fittings too, in variety). Moreover the walls are automatically gauged to the one-thousandth of an inch. Utmost care in manufacture and inspection has produced a material that will stand up under the hardest service conditions.

Straight

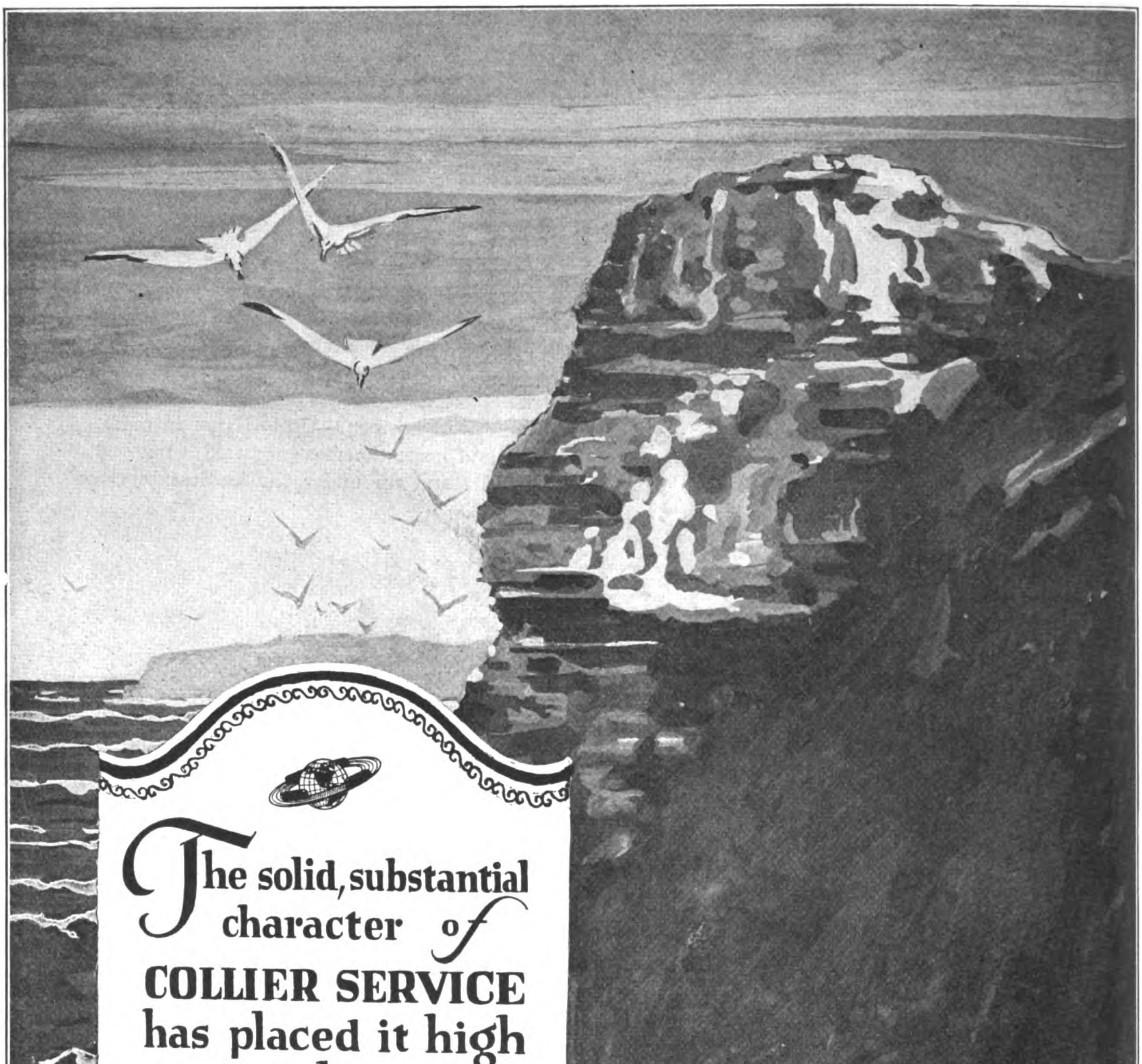
That describes the reputation of the manufacturer back of Bermico. Since 1852 the Brown Company has been known as a maker of quality pulp products.

Straight

Bermico comes straight to you through the Western Electric distributing organization. One of our 48 Houses is close enough to you to assure prompt deliveries.

Western Electric Company

OFFICES IN 48 PRINCIPAL CITIES



The solid, substantial character of COLLIER SERVICE has placed it high among those permanent organizations recognized as National Institutions

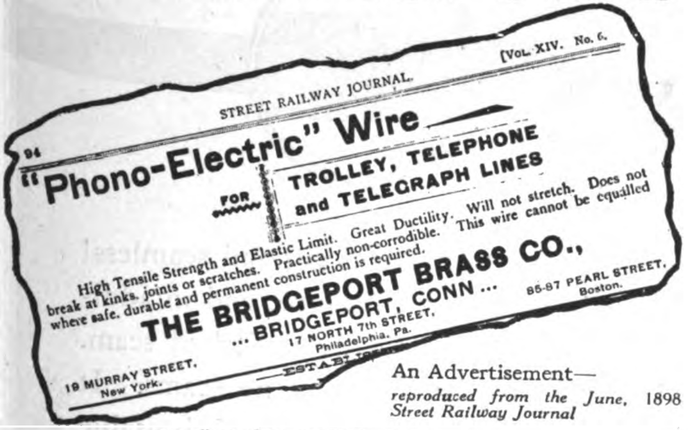
Barron G. Collier
INCORPORATED

A helpful service to the electric railway industry is located at Bridgeport.

CONNECTICUT

Bridgeport

When Dewey's Guns thundered at Manila



STREET RAILWAY JOURNAL. [VOL. XIV. No. 6.

94

"Phono-Electric" Wire

FOR TROLLEY, TELEPHONE and TELEGRAPH LINES

High Tensile Strength and Elastic Limit. Great Ductility. Will not stretch. Does not break at kinks, joints or scratches. Practically non-corrodible. This wire cannot be equalled where safe, durable and permanent construction is required.

THE BRIDGEPORT BRASS CO.,
... BRIDGEPORT, CONN ...

19 MURRAY STREET,
New York.

17 NORTH 7th STREET,
Philadelphia, Pa.

85-87 PEARL STREET,
Boston.

An Advertisement—
reproduced from the June, 1898 Street Railway Journal

Phono-Electric

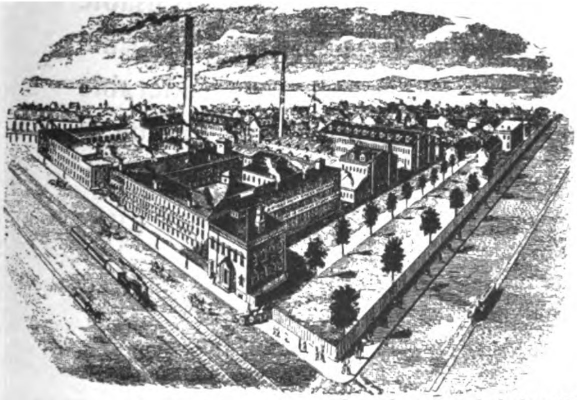
—a good wire then!

In Spanish War days, Phono-Electric was just in its infancy, in an industry which was itself quite young. Only ten years before that, the first practical trolley car installation had been made. But even in those early days progressive railway operators and electrical engineers were quick to grasp the economy-producing opportunity afforded by a trolley wire which would outlast the ordinary product three or four times.

—a better wire now!

A quarter of a century has passed. During that time experience with many installations has been translated into improvements in the manufacture of Phono-Electric. In other words a good product has been made better.

That old advertisement above, tells in the minimum number of words, the story of Phono-Electric's qualities. Those qualities are even more strongly emphasized in present-day Phono-Electric.



Our plant as it looked in 1898 when producing Phono-Electric as advertised

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA

Bridgeport Brass Company
BRIDGEPORT - CONNECTICUT

"Bridgeport"
TRADE BRASS CO. MARK
Phono-Electric

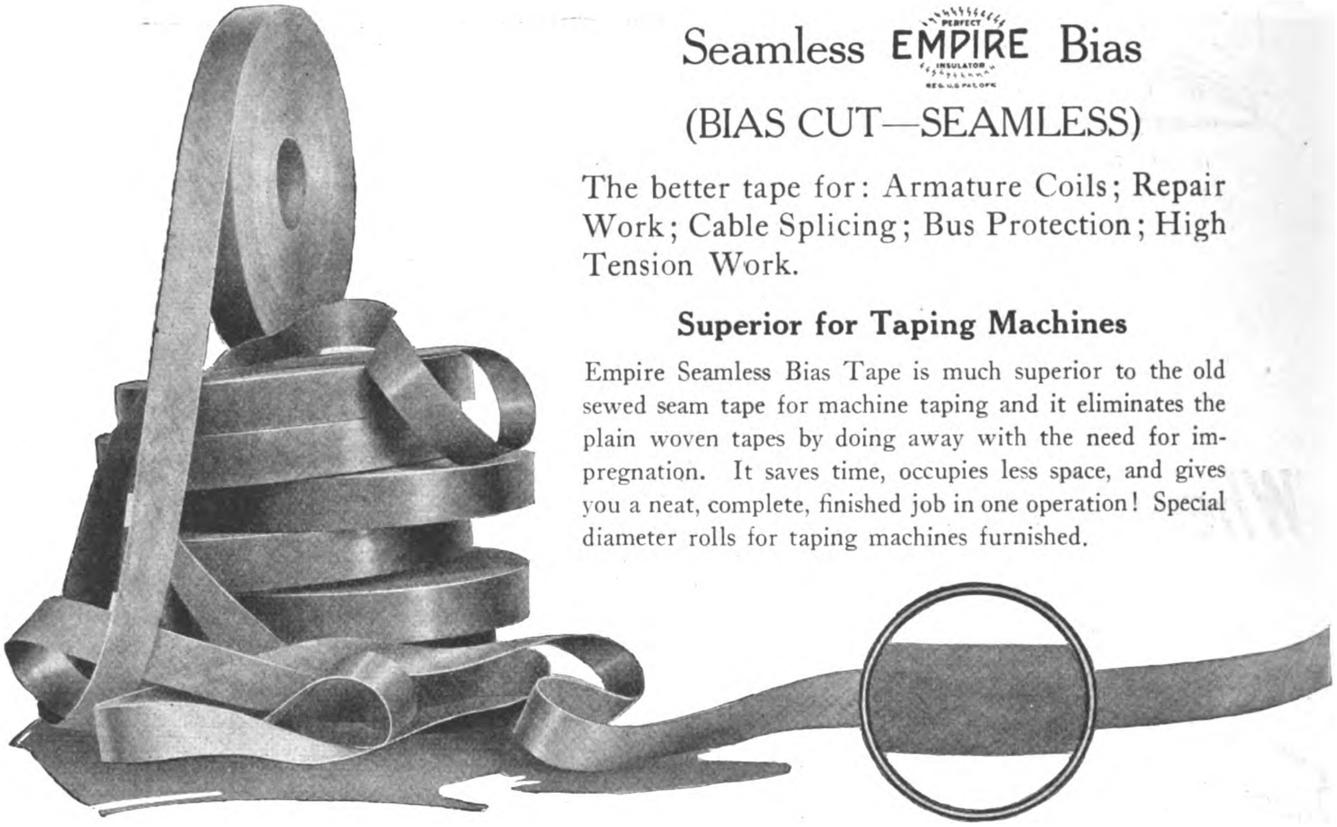
WE MAKE
Ledrite Brass Rod
Phono-Electric Contact Wire
Plumrite Brass Pipe
Phono-Hi-Strength Wire
Tubular Plumbing Goods
Condenser Tubes - Sugar Tubes
Brass, Bronze and Copper Sheets
Brass, Bronze and Copper Tubes
Auto, Bicycle and Pressure Pumps
Auto Accessories - Stampings
Engravers' Copper - Specialties
Screw Machine Products
Pressed or Drawn Products
Oil and Grease Guns

Electric Non-Ferrous

Furnace Alloys

Pershing Square Building, - - - - New York City
North American Building, - - - - Philadelphia, Pa.
Wrigley Building, - - - - - Chicago, Illinois
General Motors Building, - - - - Detroit, Michigan

This new tape will save you time and $!



Seamless EMPIRE Bias

(BIAS CUT—SEAMLESS)

The better tape for: Armature Coils; Repair Work; Cable Splicing; Bus Protection; High Tension Work.

Superior for Taping Machines

Empire Seamless Bias Tape is much superior to the old sewed seam tape for machine taping and it eliminates the plain woven tapes by doing away with the need for impregnation. It saves time, occupies less space, and gives you a neat, complete, finished job in one operation! Special diameter rolls for taping machines furnished.

Here is the new EMPIRE varnished cambric tape that is bias cut and seamless! It provides all the advantages of the regular impregnated bias tape, and in addition it is free from the limitations and drawbacks of the old-style stitched seam. It is absolutely the same thickness at all points because there are no seams. It ensures a smooth, uniformly protected insulating job, and every inch of it is usable and can be hand or machine applied. It also saves money by eliminating the time lost in cutting out the sewed seams that occur every 52 inches, and the considerable amount of tape that is wasted in cutting, and the short circuits that occur due to the failure of such seams as are left in and form weak spots that eventually break down. It saves you time and money both in application and in service and gives you a better job, either hand or machine applied.

Send for data and test pieces

Send to our nearest office for data and quotations on your insulation requirements, and for test samples and full information. Our Engineering Department is at your disposal for suggestions and recommendations.

MICA INSULATOR COMPANY

68 Church Street, New York **542 So. Dearborn Street, Chicago** **Victoriaville, Canada**

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516 Caxton Bldg., Cleveland, Ohio

THE MONROE BRASS & WIRE CO.
804 Traction Bldg., Cincinnati, Ohio

W. A. BITTNER CO.
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W. E. SPITTLER
38 Chardon Street, Boston, Mass.

THE ELECTRICAL SPECIALTY CO., Inc.
75 Fremont Street, San Francisco, Cal.

THE ELECTRICAL SPECIALTY CO., Inc.
411 South Main Street, Los Angeles, Cal.

2033-F

Rustless
Less Weight

ALUMINUM RIGID CONDUIT

SAVES WEIGHT in car construction just as do aluminum stanchions, roofs, panels, seat frames, doors, etc. Aluminum weighs only about one-third as much as ordinary metals. If 300 lbs. of iron are replaced with aluminum, the weight saving is approximately 200 lbs.

SAVES MONEY. Aluminum conduit will not rust. It has high resistance to corrosion. The expense of replacement is reduced proportionately.

Each length bears the Underwriter's Laboratories label.

Write our nearest office for data on aluminum conduit, tubing for air lines, stanchions, panels, moulding, doors, seat parts, etc.

Aluminum Company of America

Pittsburgh, Pennsylvania

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Boston
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Chicago
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Indianapolis
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Aluminum Company of America

Gentlemen:

I am interested in aluminum for..

....

Please send ☐ Representative.
☐ Information.
☐ Sample.

RJ ....

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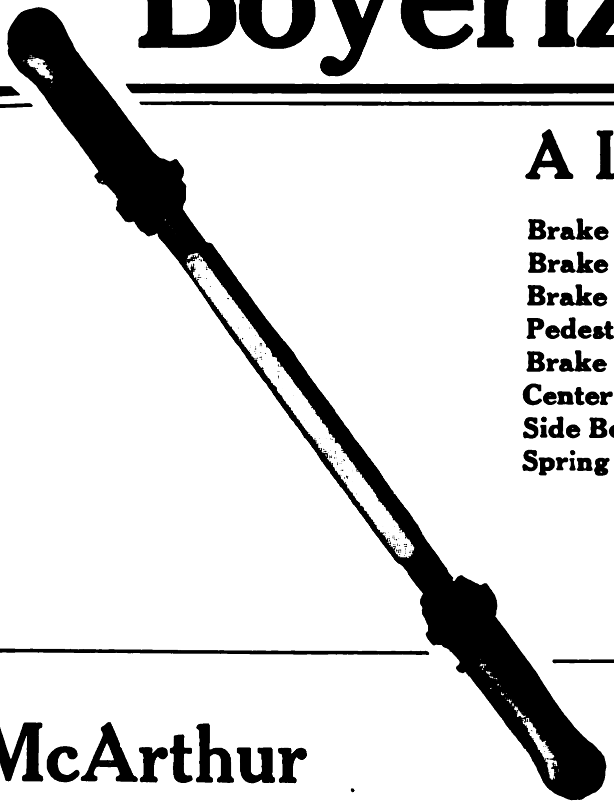
Please mail Coupon to nearest office.

Boyerized Parts!

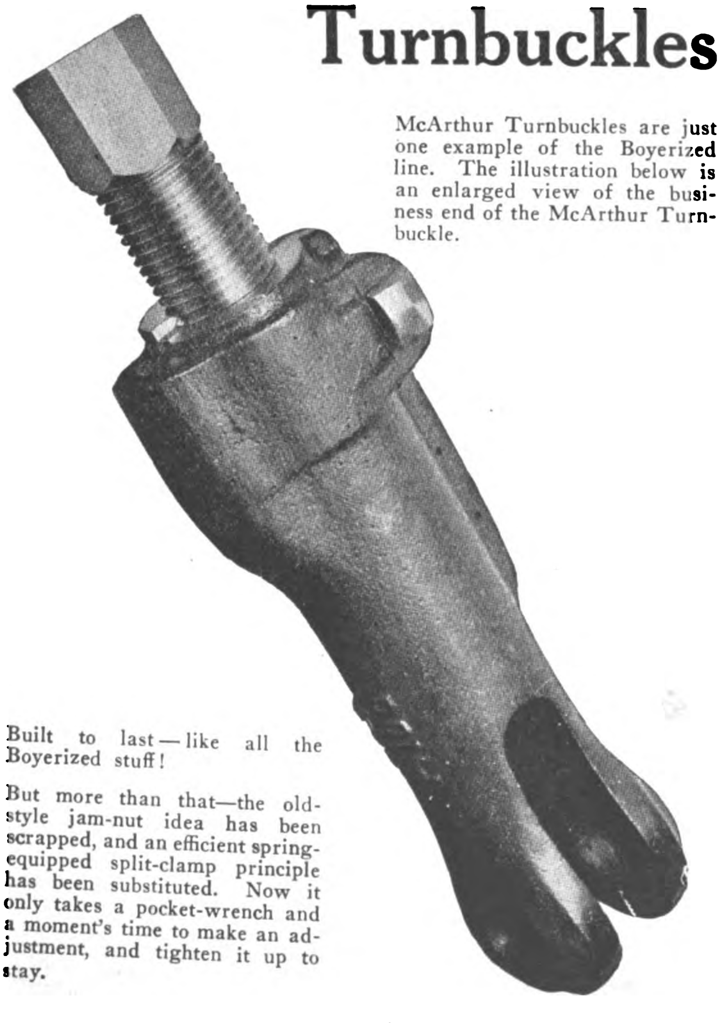
A List of Money Savers

- **Brake Pins**
- **Brake Hangers**
- **Brake Levers**
- **Pedestal Gibs**
- **Brake Fulcrums**
- **Center Bearings**
- **Side Bearings**
- **Spring Post Bushings**
- **Spring Posts**
- **Bolster and Transom Chafing Plates**
- **McArthur Turnbuckles**
- **Manganese Brake Heads**
- **Manganese Truck Parts**
- **Bushings**
- **Bronze Bearings**



McArthur Turnbuckles

McArthur Turnbuckles are just one example of the Boyerized line. The illustration below is an enlarged view of the business end of the McArthur Turnbuckle.



Built to last—like all the Boyerized stuff!

But more than that—the old-style jam-nut idea has been scrapped, and an efficient spring-equipped split-clamp principle has been substituted. Now it only takes a pocket-wrench and a moment's time to make an adjustment, and tighten it up to stay.

because—

the Boyerizing process makes them last so much longer than the usual kind of equipment. Experience demonstrates it. Try them.

Bemis Car Truck Company

Electric Railway Supplies

Springfield, Mass.

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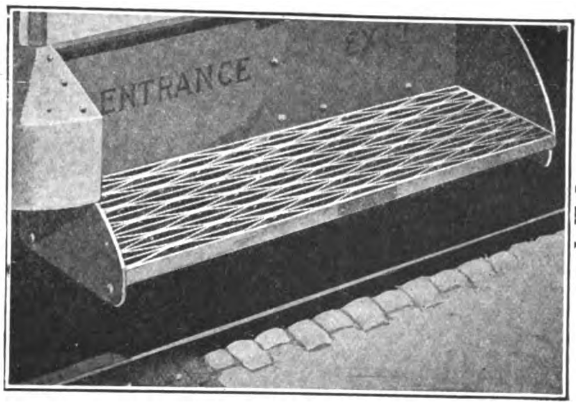
J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.



IRVING SAFSTEP

TRADE MARK

(PATENTED) REG. U.S. PAT. OFF.

ABSOLUTELY NON-SLIPPING ALWAYS

Whatever the type or character of your car equipment, and whether for city or interurban traffic, **Irving Safsteps** will mean greater safety and comfort for your passengers, and lower step-accident hazard for you.

Absolutely Non-Slipping—under all conditions—wet or dry—even with snow or ice upon them.

Extremely Light Weight, with the utmost of strength and rigidity.

Permanently Non-Slipping—no abrasive insets, no bars or mats to wear out and work loose.

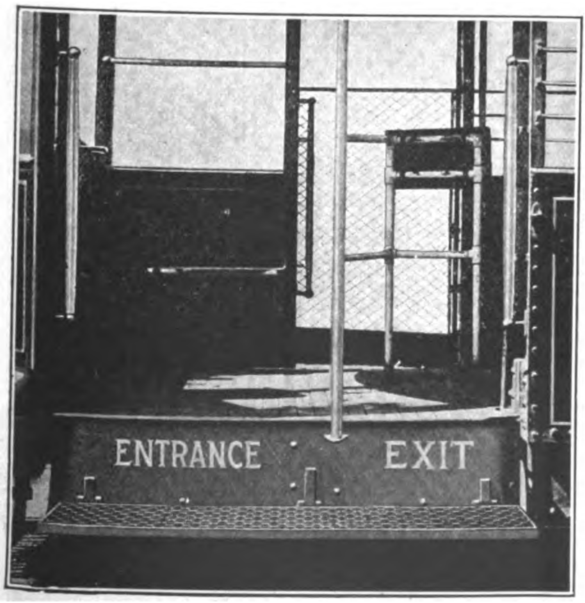
Practically Indestructible, because made of steel members solidly riveted up in a self-contained unit.

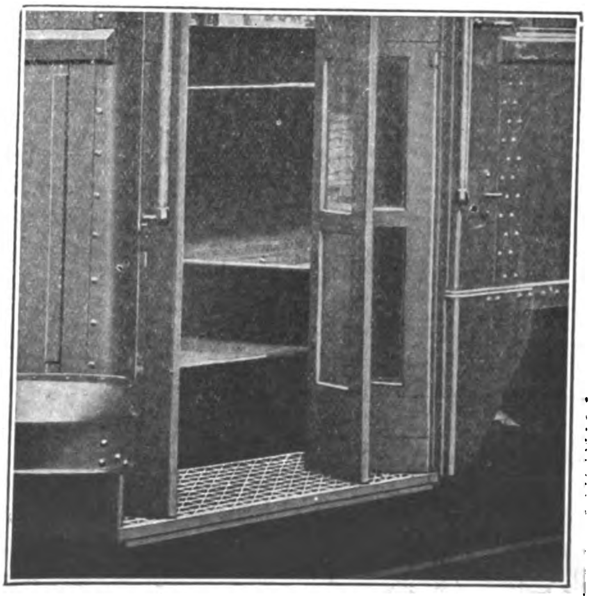
Cleanly, because dirt and dust fall through and are not tracked into the car.

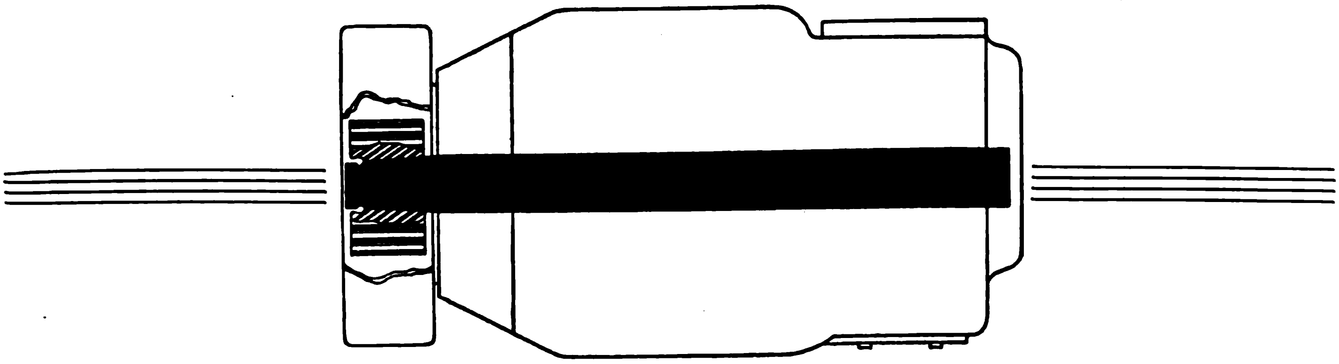
Economical, because time-roof and wear-proof, and adapted to any type or size of car.

Think of the dollars-and-cents value of these Safstep qualities, on your own lines. Then write for Catalog 4A28.

IRVING IRON WORKS CO.
LONG ISLAND CITY, N.Y., U.S.A.







ARMATURE SHAFTS

Armature shafts are subject to alternating stresses incessantly repeated.

If there is any point of weakness, a fracture starts and slowly progresses until the shaft is no longer able to stand up. There is no economy, therefore, in purchasing "cheap" forgings. A shaft made of open hearth hammered steel by Standard Steel Works Company may be purchased with assurance of real economy.

"Not only to make better products but to make them better understood—not only to sell but to serve, assisting those who buy to choose as well as use their purchases—this is the privilege, if not the practice of all modern manufacturers."—Vauclain.

STANDARD STEEL WORKS COMPANY

PHILADELPHIA, PA.

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PITTSBURG, PA.
MEXICO CITY, MEX.

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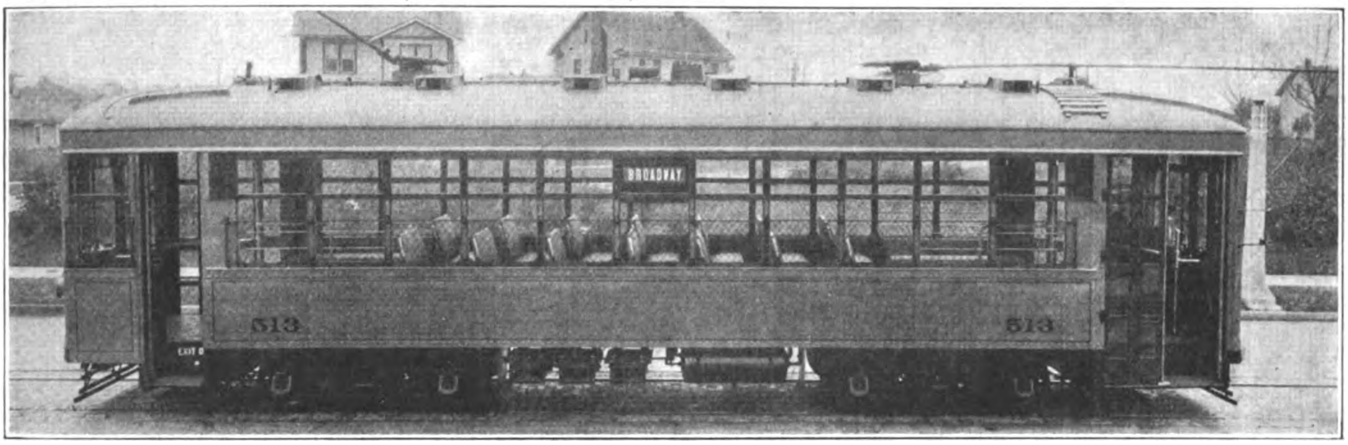
St. Louis Quality Cars



New City Cars for Indiana Service Corporation, Fort Wayne, Ind.

These new double-truck, one-man, front-entrance, end exit cars are arranged with double selective-type doors at front to expedite loading; the exit is the rear door controlled from the motorman's position; there is a motorman's signal light in each vestibule connected with the rear exit-door. These cars are 39 ft. 11 in. long over all with 2 ft. 4½ in. post spacing and seating capacity of 44 passengers. Trucks are St. Louis AM 64 diamond arch, bar type equipped with quadruple 25 H.P. motors.

St. Louis Car Company
St. Louis, Mo.
"The Birthplace of the Safety Car"

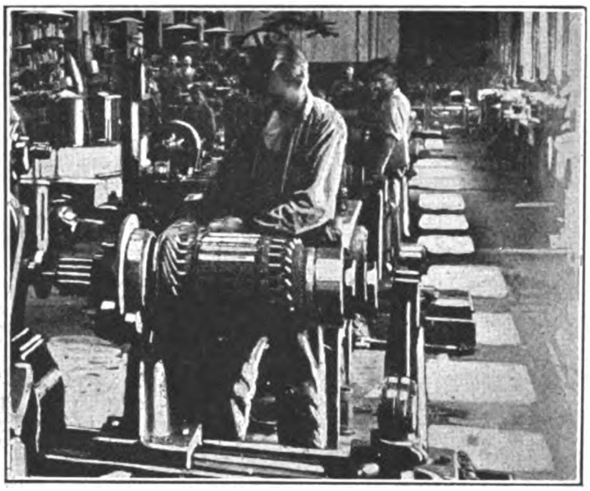
Further particulars sent upon request.

Nuttall

Watch for an early announcement of the new Nuttall Timken Roller Bearing Trolley Base.

R.D. NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.



REDUCE
ASSEMBLY AND PRODUCTION
COSTS
with IRV-O-SLOT
and SEAMLESS BIAS TAPE

It's a simple thing to lay down a piece of combination slot insulation (cut to specification) and insert the coil or coils. Irvington slot insulation is made up of a layer of varnished cambric and a layer of fibrous paper solidly cemented together with a flexible insulating compound that will not dry out.

And the Seamless Bias tape is a big time- and labor- and material-saver as compared with the old type of sewed bias.

Place a trial order of both.
Sign that requisition now.

Irvington Products

Varnished Silk
Varnished Paper
Black and Yellow Varnished Cambric
Straight and Bias Varnished Cambric Tapes
Flexible Varnished Tubing
Special Folded Paper for Coil Windings
Transformer Leads
"Cellulak"
Special Adhesive
High Dielectric Paper
Insulating Varnishes and Compounds
"Irv-O-Slot" Insulation

IRVINGTON VARNISH & INSULATOR CO.
Irvington, New Jersey.

Established 1905
Sales Representatives:
Mitchell-Rand Mfg. Co., New York
T. C. White Electrical Supply Co., St. Louis
E. M. Wolcott, Rochester
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Consumers Rubber Co., Cleveland
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"Tool Steel"
HELICALS
are just as superior
in quality as
"Tool Steel"
SPURS.

Tool Steel Quality

The Tool Steel
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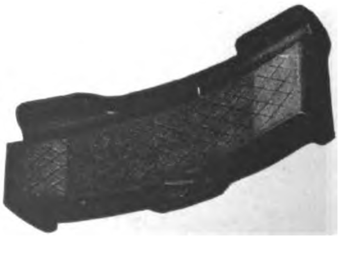
CINCINNATI, O.

Brake Shoes
A.E.R.A. Standards
Diamond "S" Steel Back is the Best Type

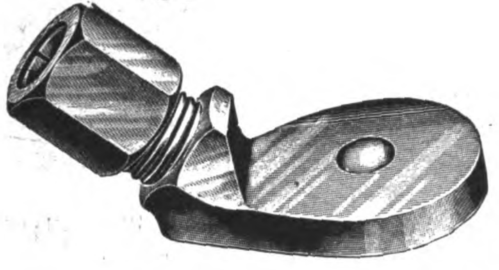
Standard
Patterns
for

SAFETY
CAR



D-67 for Narrow Treads
D-87 for Wide Treads

American Brake Shoe and Foundry Co.
30 Church Street, New York
332 So. Michigan Ave., Chicago Chattanooga, Tenn.



SOLDERLESS

Dossert Angle Lugs

When we say SOLDERLESS we mean by that the Dossert *Tapered Sleeve* principle of solderless connection.

The 15th Year Book illustrates and describes the various units that make up the line together with full data on use.

Write for a copy.

GET THIS BOOK

DOSSERT SOLDERLESS CONNECTORS CATALOGUE FIFTEEN

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New York, N. Y.

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CREOSOTERS
Washington Court House, Ohio

Cross Ties Bridge Timbers
Lumber Posts
Piling

Treated and Untreated

We solicit your inquiries

Creosoting Plant located
Washington Court House, Ohio
On—Penna. R.R., B. & O. R.R., D. T. & I. R.R.
Operating Mills in Southern Ohio

Standard Underground Cable Co.
Pittsburgh, Pa.

TRADE MARK

Manufacturers of
Copper, Brass, Bronze Wires, Rods, Tubes
Copper Clad Steel Wire
Insulated Wire of all kinds
Lead Covered and Armored Cables
Cable Terminals, Junction Boxes, etc.

Boston, Washington, Philadelphia, Pittsburgh, Seattle, Chicago, New York, Atlanta, San Francisco, Detroit, Los Angeles, St. Louis

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BARE COPPER WIRE AND CABLE
TROLLEY WIRE
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MAGNET WIRE

AMERICAN ELECTRICAL WORKS AMELECTRIC Wires and Cables PHILLIPSDALE, R.I.
Reg. U. S. Pat. Office

Incandescent Lamp Cord

AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.
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Cincinnati, Traction Bldg.; New York, 100 E. 42nd St.

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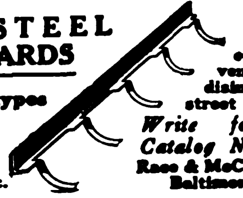

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Proven by service to economically prevent seepage and disintegration of street railway paving.

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SOLDER
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1881

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Frogs, Crossings, Switches and Mates
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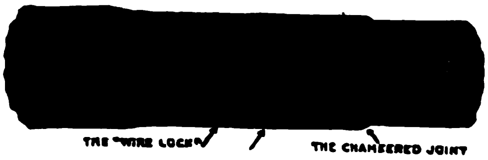

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Lightest Weight
Greatest Adaptability

Catalog complete with engineering data sent on request

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THE OKONITE COMPANY
PASSAIC, N.J.
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Great Adhesive Strength
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Long Life
Price Right

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U. S. ELECTRIC AUTOMATIC SIGNAL
for single track block signal protection
United States Electric Signal Co.
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Double Hot Galvanized to preserve that strength.

Type B, Eye and Hook

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Lorain Special Trackwork Girder Rails

Electrically Welded Joints

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Johnstown, Pa.

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Design and Manufacture
of
Standard—Insulated—and Compromise Rail Joints

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Metal Safety Railway Tie Co.
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All-metal cross ties
Types for open and closed tracks
"More flexible than wood"
See advertisement, issue, Sept. 29, page 86.
Ask for circular on either type. *Prices upon application.*

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Highway Crossing Bells
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NACHOD SIGNAL COMPANY, INC.
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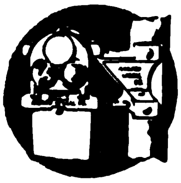

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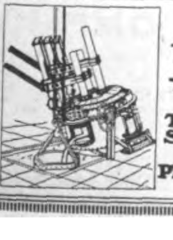

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Ten Standard Sizes 1/16 to 24 Tons Capacity
Most Rapid and efficient for making
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For Street and Steam Railways

Steel Castings **Gas Cylinders**
ORIGINATORS OF
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Arc Welding and Bonding Outfit

Rugged series resistance coil
Indestructible Mica insulation
Normal welding current at half voltage

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High-grade R. R. Track and Car Jacks

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Ramapo Automatic Return Switch Stands for Passing Sidings
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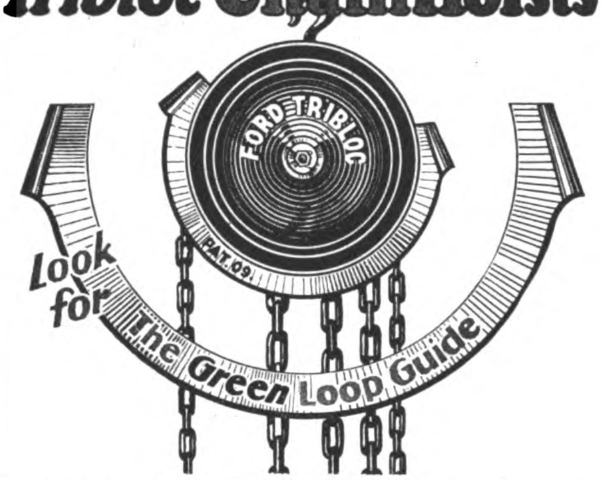
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PAT. 09
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These hoists have 80 per cent efficiency. For example, an eighty-two pound pull on the chain of a 1-ton Tribloc will lift a ton. Made in capacities from $\frac{1}{4}$ to 20 tons.

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Overseas Representatve: Allied Machinery Co. of America
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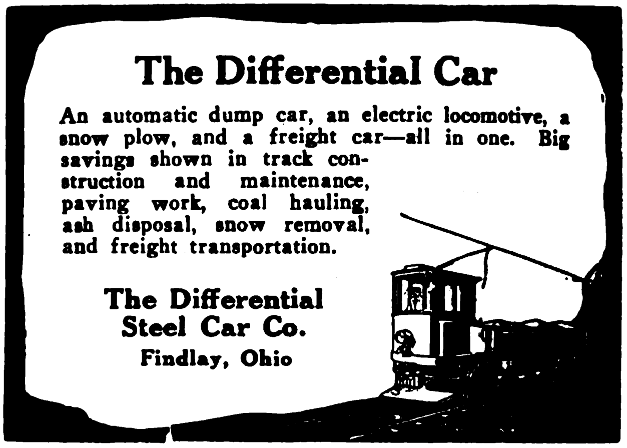

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An automatic dump car, an electric locomotive, a snow plow, and a freight car—all in one. Big savings shown in track construction and maintenance, paving work, coal hauling, ash disposal, snow removal, and freight transportation.

The Differential Steel Car Co.
Findlay, Ohio

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Builders since 1868 of Water Tube Boilers of continuing reliability

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Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893

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"HONEYCOMB" AND "ROUND JET" VENTILATORS
for Monitor and Arch Roof Cars, and all classes of buildings:
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E.R.J.

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DRAFTSMEN-COMPUTERS wanted on railway trackwork working knowledge of and facility in trigonometry essential. State in letter, age, education, experience and approximate salary. Employment Dept., Bethlehem Steel Co., Steelton, Pa.

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Three Electric Cars

New cars still in the shop, modern in every way, 45 passengers, standard gauge, designed for interurban service in Cuba, each equipped with two G. E. 50 hp. motors for D.C. 1200 v. Acquired by judgment. We will sell cheap.

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2—Unused General Electric, type 210-H. 50% of market price.

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50—G. E. No. 80-A Motors.
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35—B-2 Compressors.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

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Cars, Locomotives, Tanks, Steel Piling Fairbanks-Morse Standard Gage Gasoline Motor Car; Seats 34 people

ZELNICKER IN ST. LOUIS

400 Tons 65 lb. rails

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BOILER

1—Second-hand Sterling Water Tube, 260 hp., in good condition.

Apply,
NEW YORK STATE RAILWAYS
Purchasing Dept.
Rochester, N. Y.

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28 WHs 101-B-2 Motors
10WHs 101-D Motors

TRANSIT EQUIPMENT COMPANY
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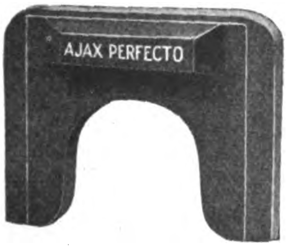

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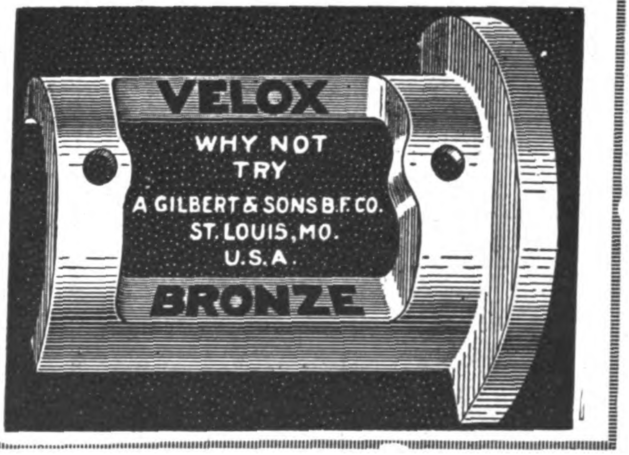
The Ajax Metal Company
Established 1880
Philadelphia, Pa.

NEW YORK CHICAGO BOSTON CLEVELAND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WHY NOT TRY
A GILBERT & SONS B.F. CO.
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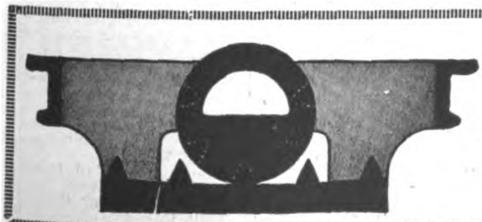
U.S.A.
BRONZE



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Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.

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Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

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Ingersoll-Rand Co.
Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.
Armature Shop Tools
Elec. Service Supplies Co.
Automatic Return Switch Stands
Ramapo Ajax Corp.
Automatic Safety Switch Stands
Ramapo Ajax Corp.
Axles
Bemis Car Truck Co.
St. Louis Car Co.
Standard Steel Works Co.
Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Westinghouse E. & M. Co.
Babbitt Metal
Ajax Metal Co.
Badges and Buttons
Elec. Service Supplies Co.
International Register Co., The
Bearings and Bearing Metals
Ajax Metal Co.
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General Electric Co.
Gilbert & Sons B. F. Co., A.
St. Louis Car Co.
Westinghouse E. & M. Co.
Bearings, Center and Boiler Side
Baldwin Locomotive Works
Stucki Co., A.
Bells and Gongs
Brill Co., The J. G.
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Railway Track-work Co.
Rail Welding & Bonding Co.
Western Electric Co.
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Amer. Steel & Wire Co.
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Ohio Brass Co.
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Rail Welding & Bonding Co.
Western Electric Co.
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Bates Expanded Steel Truss Co.
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Hubbard & Co.
Ohio Brass Co.
Brake Adjusters
National Ry. Appliance Co
Westinghouse Tr. Br. Co.
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Amer. Br. Shoe & Fdy. Co.
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Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.
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Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
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National Brake Co.
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General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Stackpole Carbon Co.
Westinghouse E. & M. Co.
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Anderson Mfg. Co., A. & J. M.
Brushes, Wire, Pneumatic
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St. Louis Car Co.
Bushings, Case Hardened and Manganese
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Brill Co., The J. G.
St. Louis Car Co.
Cables. (See Wires and Cables.)
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Irvington Varnish & Ins. Co.
Mica Insulator Co.
Carbon Brushes (See Brushes, Carbon)
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Differential Steel Car Co.
St. Louis Car Co.
Car Lighting Fixtures
Elec. Service Supplies Co.
Car Panel Safety Switches
Consolidated Car Heati'g Co.
Westinghouse E. & M. Co.
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Kuhlman Car Co., G. C.
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St. Louis Car Co.
Wason Mfg. Co.
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St. Louis Car Co.
Cars, Second Hand
Davison Chemical Co., The
Electric Equipment Co.
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General Electric Co.
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Dossert & Co.
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St. Louis Car Co.
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Coils Armature and Field
Economy Elec. Devices Co.
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General Electric Co.
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Commutator Truing Devices
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Ingersoll-Rand Co.
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Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.
Cranes
Allis-Chalmers Mfg. Co.
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Crossing Foundations
International Steel Tie Co.
Crossing, Frog & Switch
Ramapo Ajax Corp.
Wharton, Jr., & Co., Wm.
Crossing, Manganese
Ramapo Ajax Corp.
Crossings
Ramapo Ajax Corp.
Crossings, Track (See Track, Special Work)
Crossings, Trolley
Ohio Brass Co.
Curtains and Curtain Fixtures
Brill Co., The J. G.
Elec. Service Supplies Co.
Morton Mfg. Co.
St. Louis Car Co.
Dealer's Machinery
Elec. Equipment Co.
Toledo & Indiana R.R. Co.
Transit Equip. Co.
Zelnicker Supply Co., Walter A.
Derailing Devices (See also Track Work)
Derailing Switches
Ramapo Ajax Corp.
Destination Signs
Elec. Service Supplies Co
Detective Service
Wish-Service, P. Edward
Door Operating Devices
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General Electric Co.
Hale & Kilburn Co.
St. Louis Car Co.
Doors & Door Fixtures
Brill Co., The J. G.
Consolidated Car Heati'g Co.
General Electric Co.
Nat'l Pneumatic Co., Inc.
Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.
Drills, Rock
Ingersoll-Rand Co.
Drills, Track
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Ohio Brass Co.

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Ears
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Railway Track-work Co.
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Arnold Co., The
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Jackson, Walter
Kelly Cooke & Co.
Ong, Joe R.
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Irving Iron Works
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Carnegie Steel Co.
Standard Steel Works Co.
Frogs & Crossings, Tee Rail
Ramapo Ajax Corp.
Frogs, Track (See Track Work)
Frogs, Trolley
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Pittsburgh Elec. Furnace Corp.
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Guard Rails, Tee Rail & Manganese
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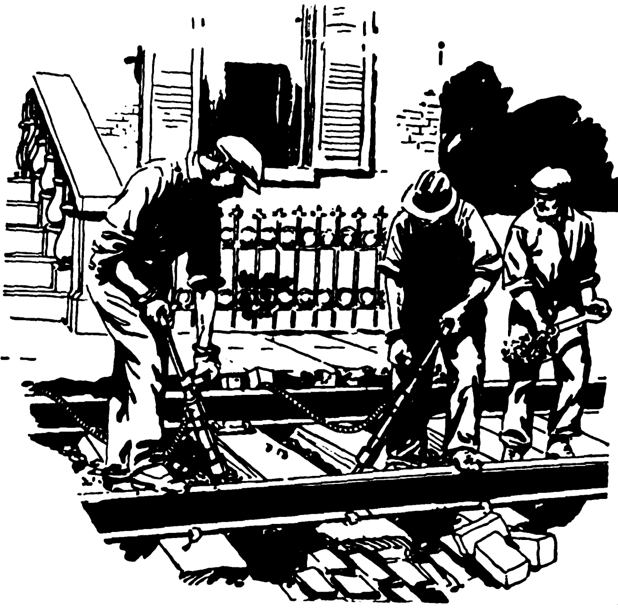

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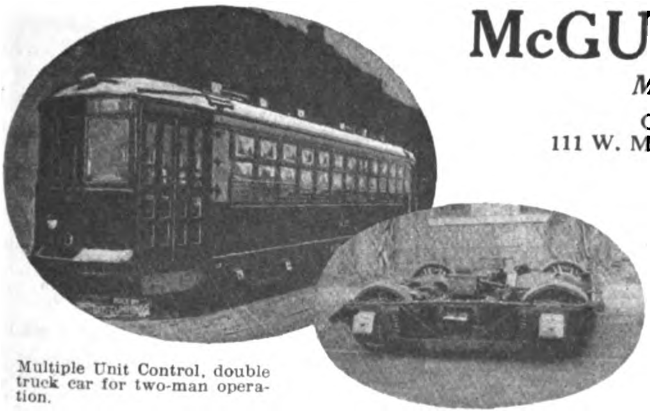

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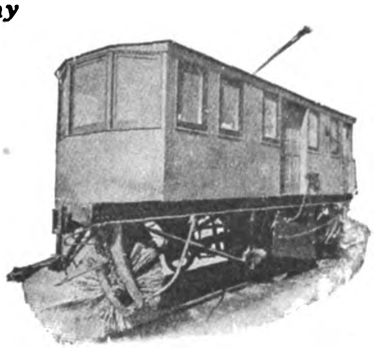

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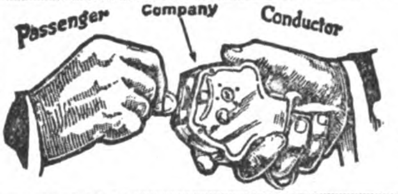

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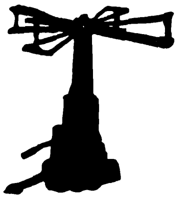

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The Peter Smith Heater Company
6209 Hamilton Ave., Detroit, Mich.

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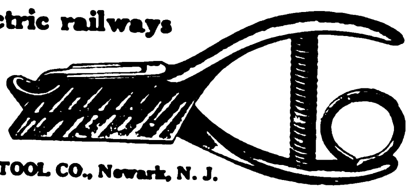

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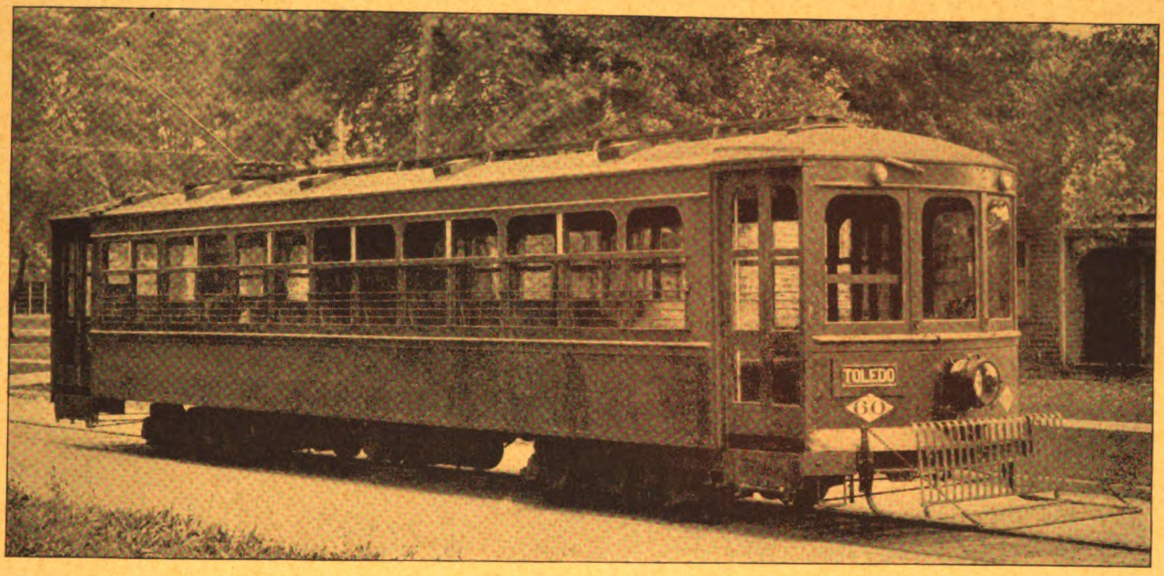

Light-weight Interurban Cars for Northwestern Ohio Ry. & Pwr. Co.

This type of light-weight interurban car for single-end operation built by the G. C. Kuhlman Car Company has been adopted by the Northwestern Ohio Ry. & Pwr. Company, operating between Toledo and Bay Point, Ohio, a 55-mile run.

Fully equipped ready for operation, this type car weighs but 34,500 lb. while the type car displaced weighed 66,000 lb., assuring an appreciable saving to the company in operating costs. These cars are mounted on Brill 77-E-1 trucks with 26-in. diameter wheels constructed with special swing links for higher speed service. Thirty-five horsepower motors are included in the equipment and the schedule speed under which the cars are operated is 21.6 miles per hour.

The car body is 47 ft. 4 in. long over bumpers, 8 ft. 6 in. wide over posts and has seating accommodations for 56 passengers. It is so partitioned that the front part of the car is the main passenger compartment, giving a most pleasant and unobstructed view to the front and sides. The rear part of the car is set aside as a smoking compartment while the rear platform is used for baggage.

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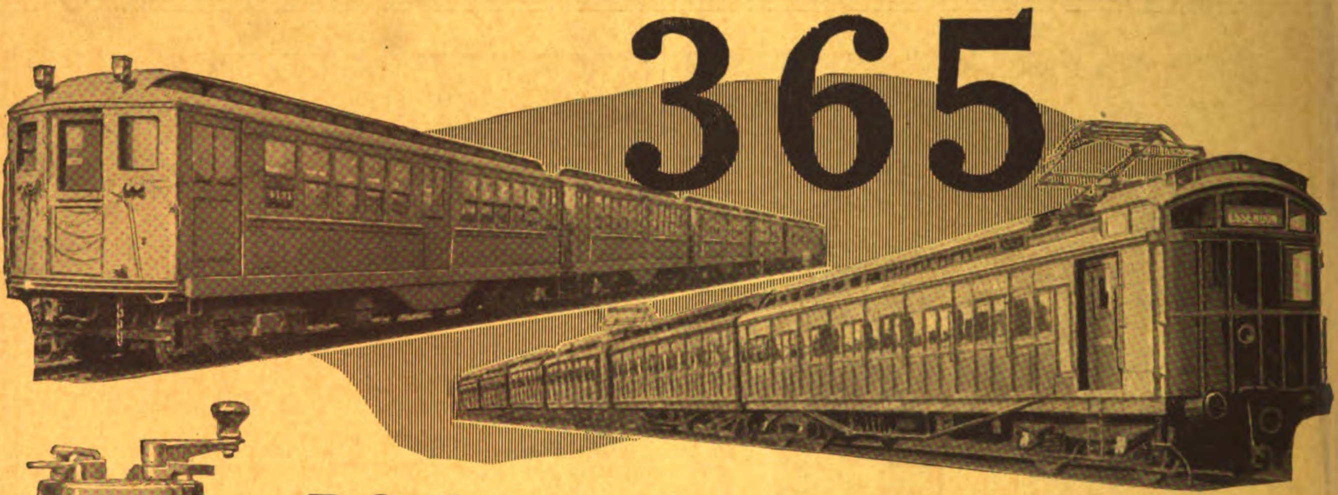

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365 Equipments Now on Order

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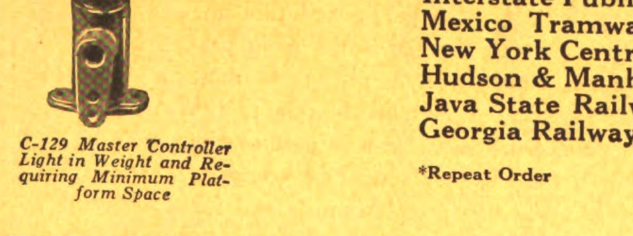
PC5-Motor Controller with Cover Off—Arc Chute Swung Down—Showing Accessibility for Repairs and Inspection



PC5-Motor Controller Complete

Heavy and congested service requires train operation. The adoption of PC Control is insurance of reliability in this class of service. More than 65% of the equipment listed above are repeat orders—the best recommendation for any equipment.

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Schenectady, N. Y.

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MONTHLY MAINTENANCE ISSUE

ELECTRIC RAILWAY JOURNAL

TF
701
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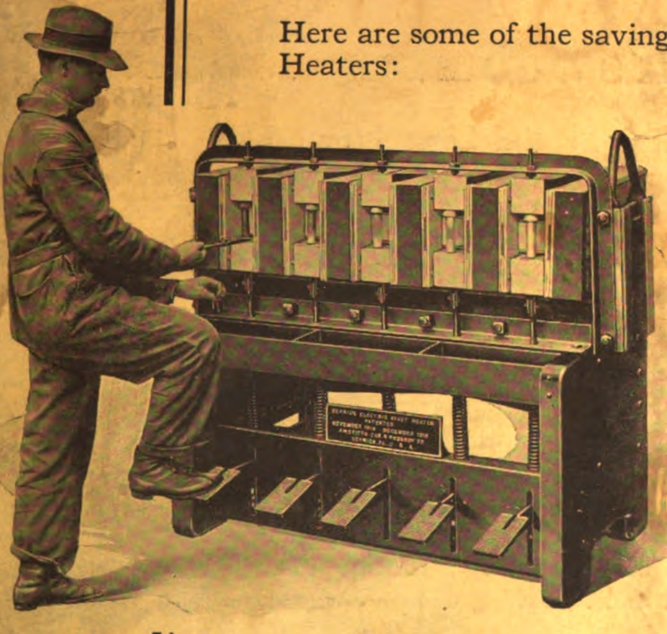
Many Small Economies Mean Big Total Savings

Small savings multiplied many times daily, and then multiplied over and over for many days, weeks, months, and years, make up big totals which interest big executives.

Here are some of the savings effected by Berwick Electric Rivet Heaters:



1.—Power used only when heating rivets; no waste. 2.—Hot rivets in 15 to 30 seconds; no delays. 3.—Burning and scaling spoilage practically eliminated. 4.—Absence of scaling saves $\frac{1}{8}$ in. to $\frac{1}{4}$ in. length per rivet. 5.—Convenient portability saves time. 6.—Visible heating means uniform heating; fewer hammer blows; time saved. 7.—No relining of furnaces; no compressed air; no leaky valves and pipe connections; no handling of fuel and ashes; no clean-up expense.

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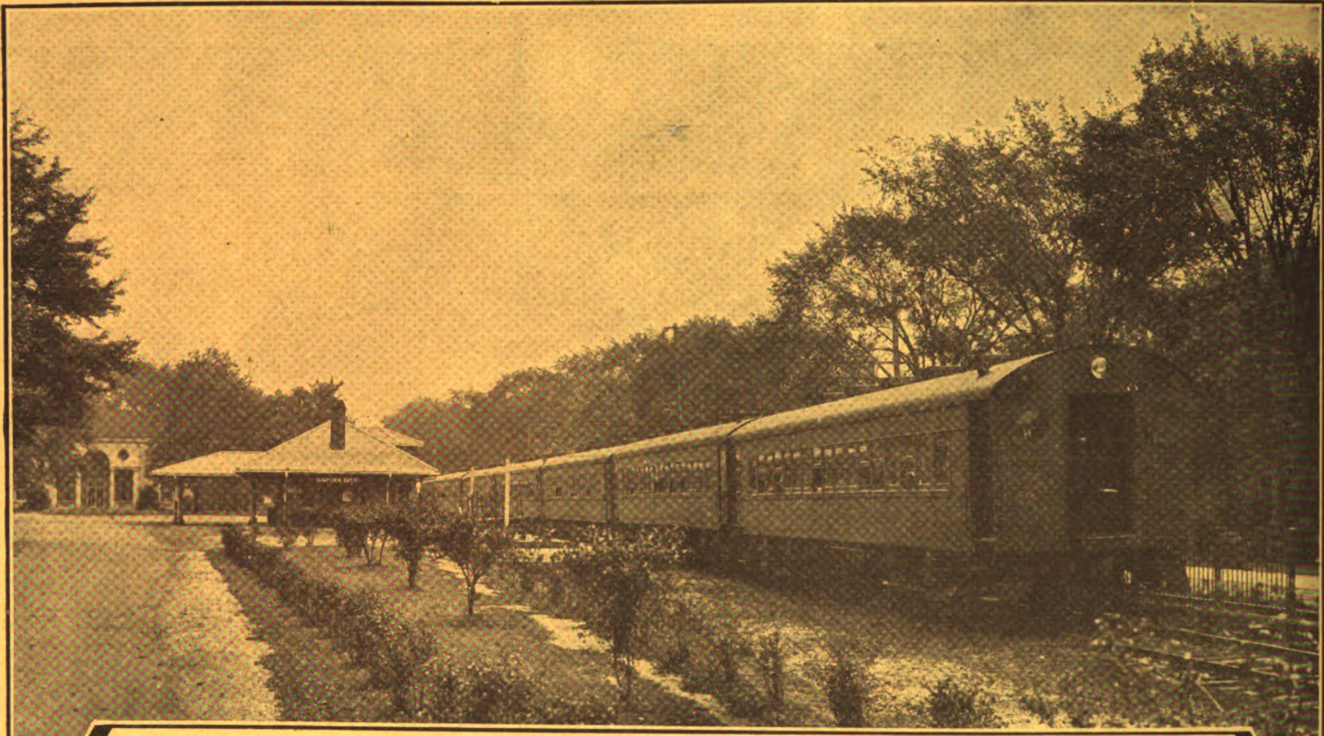

Multiple-Unit Train of the Long Island Railroad

Handling New York's Suburban Traffic

Passengers and freight carried by the Long Island Railroad during:

1905	1922
Passengers: 18,000,000	Passengers: 79,656,891
Freight: 2,745,000 tons	Freight: 6,027,860

The Long Island was electrified in 1905 and is now operating 494 multiple-unit cars equipped with Westinghouse Motors and Electro-Pneumatic Control.

To take care of increasing traffic and to maintain its high standard of service, 104 new equipments of Westinghouse No. 308 Motors and electro-pneumatic control have been purchased, thereby increasing the number of motor cars 21%, and furnishing 8300 additional seats for the traveling public.

Westinghouse Electric & Manufacturing Company

East Pittsburgh, Pennsylvania

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Use of Mold in Arc Welding Copper Bonds Gives Good Results 1001
BY CHESTER F. GAILOR.
Two methods of arc welding are described. The first employs a carbon electrode and the second a copper alloy rod. Figures of numerous bond tests are given. Procedure has been developed as a result of research covering three years.

Systematic Inspection Reduces Pull-Ins 1003

Reclamation Storeroom Accomplishes a Big Saving ... 1004
The system developed by the Northern Texas Traction Company for reclaiming waste material has improved efficiency of mechanical department and reduced expenses.

Repairs to Car Bodies Principal Expense Item in Railway Shops 1004

Insuring a Bearing Under Steel Ties 1005

Good Reports of Ciment Fondu Confirmed 1006

Good Results from Lettering Signs by Silk Screen Process 1007
Details are given for making stencils and frames, for mounting to save time and labor, for applying the color, making the squeegees and for handling and drying the signs after they are lettered.

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79.5%

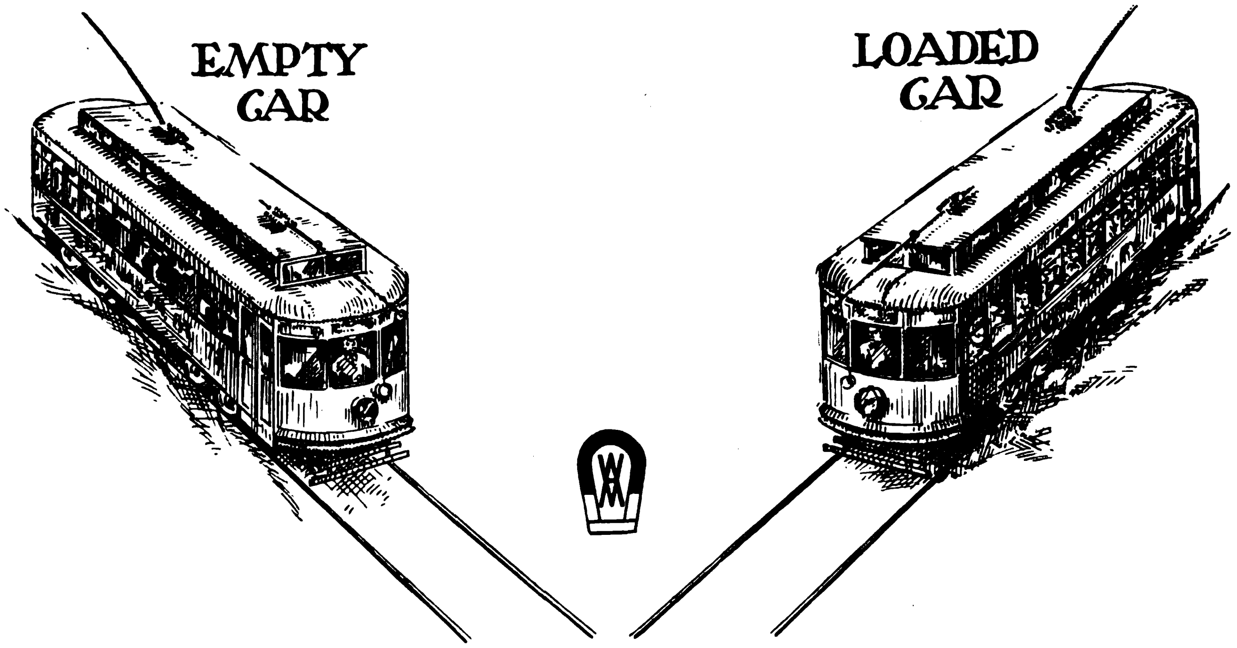
DURING the year just closing, 79.5 per cent of the readers of the ELECTRIC RAILWAY JOURNAL have renewed their subscriptions. This is the measure used by the Audit Bureau of Circulations, and required in its reports, to indicate the value of a publication to its readers. It is a measure that can be gotten only when a paper has strictly a paid circulation.

This renewal percentage of the ELECTRIC RAILWAY JOURNAL subscribers is the highest of the fourteen McGraw-Hill publications, and is probably not equalled by any other magazine.

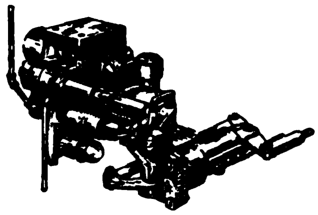
Such evidence of the high regard with which electric railway men hold this paper is indeed an inspiration to the editors and the publisher to keep on striving to make it a product of exceptional interest and practical value.

The accomplishment is perhaps all the more remarkable in view of the fact that the revenue of the paper, because of the small number of manufacturers serving the field, is limited.

Number of Copies Printed, 7,100 Advertising Index—Alphabetical, 50; Classified, 46, 48; Searchlight Section, 45



Same Stopping Distance!



THE VARIABLE LOAD BRAKE

The Westinghouse Variable Load Brake has been developed to solve the problem of controlling cars under widely varying load conditions. It is an attachment which may be added to any straight air or semi-automatic equipment whereby the braking force is automatically adjusted to suit the weight on the car, by regulating the brake cylinder pressure as the weight changes. The adjusting mechanism is thrown into engagement by the opening of the car doors. While the doors are open, passengers are leaving and entering the car, and when the doors are closed again, the condition of loading will be that under which brake operation will take place for the next stop, or a slow-down, as the occasion may demand. The use of the Brake insures stopping within a uniform distance regardless of whether the car is empty or loaded.

IT MAKES no difference whether a car is entirely empty, or is loaded to capacity, the stopping distance with the Variable Load Brake will be the same.

Can you visualize the tremendous advantage of that — stopping a fully loaded car in as short a distance as would otherwise be possible only if it were empty?

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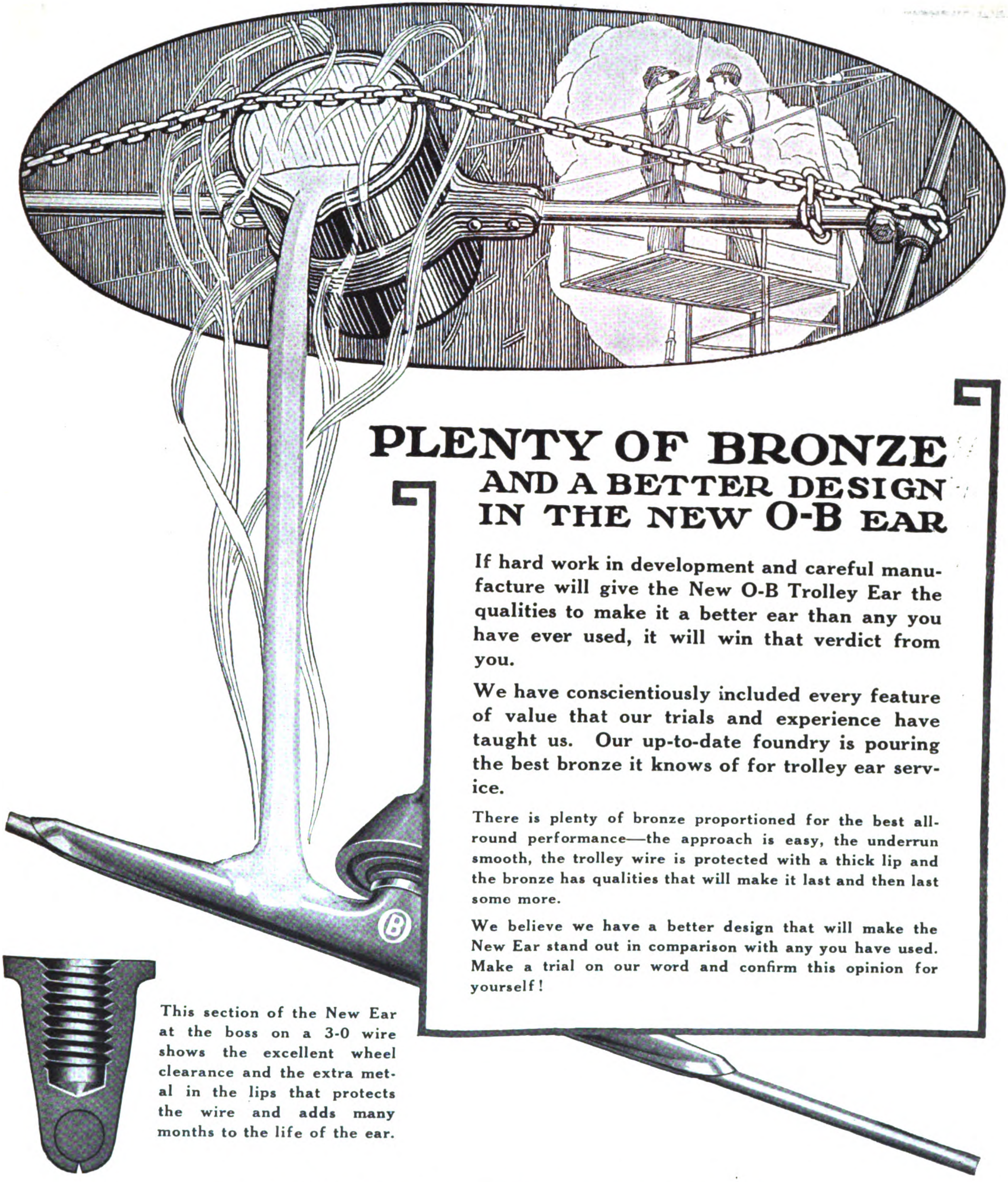

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We believe we have a better design that will make the New Ear stand out in comparison with any you have used. Make a trial on our word and confirm this opinion for yourself!

This section of the New Ear at the boss on a 3-0 wire shows the excellent wheel clearance and the extra metal in the lips that protects the wire and adds many months to the life of the ear.

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If it doesn't give you 225 amperes even under these conditions, you don't get a good weld—you don't get the necessary penetration.

That is one basis on which many roads have selected the "AJAX" Electric Arc Welder. A series of switches gives you always the amperage necessary for a lasting weld—even under most adverse conditions. Ask for Bulletin showing the details and you will see why this is so.

Railway Trackwork Co.

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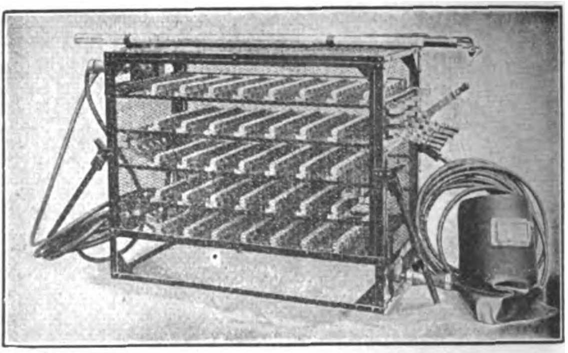

"Ajax" Electric Arc Welder

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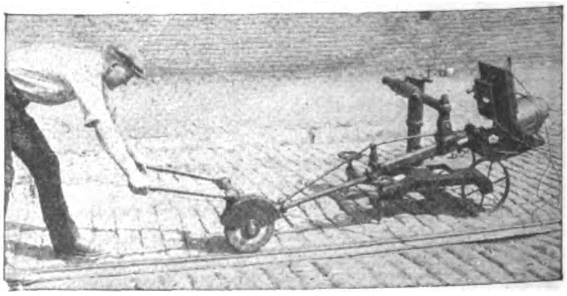
ATLAS RAIL GRINDER

"Atlas" Rail Grinder



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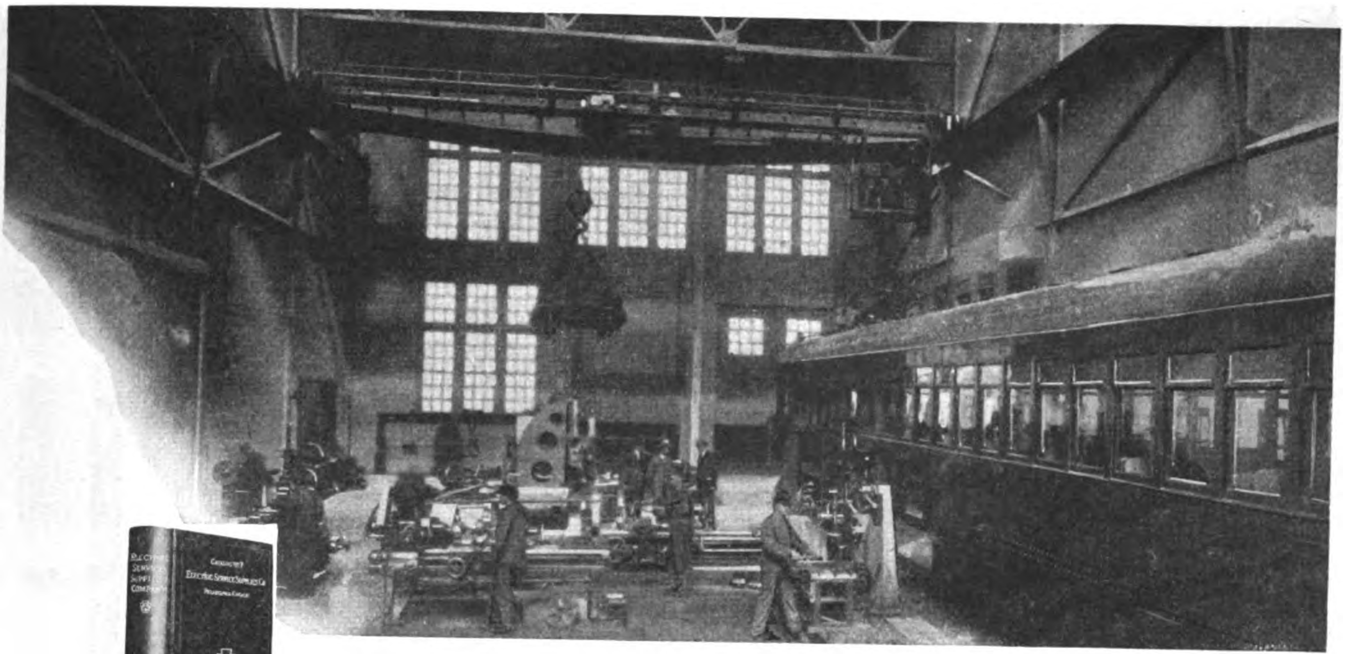
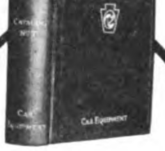
"Reciprocating" Track Grinder





Efficient Shops

cut transportation costs

Direct charges for maintenance and repairs are less in a well-equipped shop. Labor hours are reduced, and the work done is more effective.

Indirect gains are probably even greater. Cars properly maintained keep better schedules. There are fewer crippled cars on the road; breakdowns in service are unusual. Cars are more comfortable and more attractive to passengers.

Keystone Shop Equipment is designed and built for efficient and economical work. Scan the list at the left and check off the items in which you would be interested.

Catalog No. 7
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- Peerless Armature Machines
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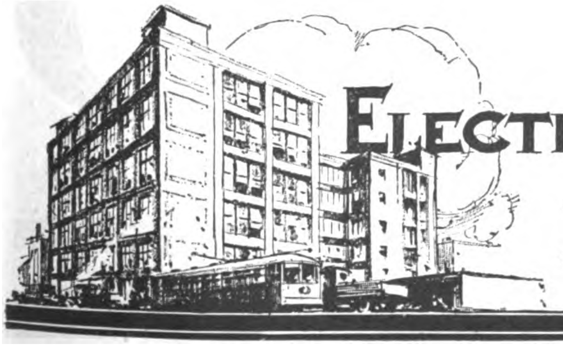
- Century Type Testers
- Peerless Pinion Pullers
- Peerless Floor Cranes
- Peerless Pit Jacks
- Simplex Jacks
- Reading Car Replacers
- Electric Drilling Machines
- Fountain Window Washers
- Keystone Sand Dryers
- Contact Rail Material

*Our representative will be glad to call
and talk it over with you*



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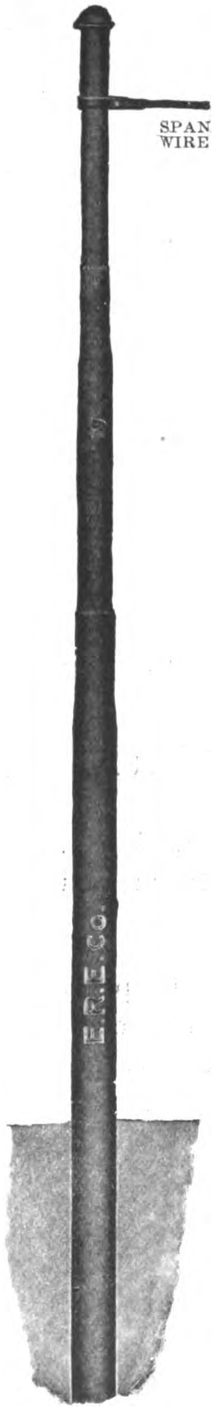

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SPAN WIRE
E.R.E.CO.

Why—

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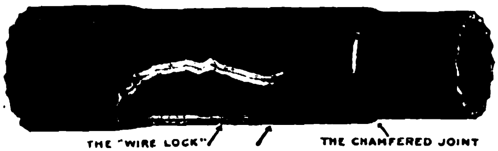

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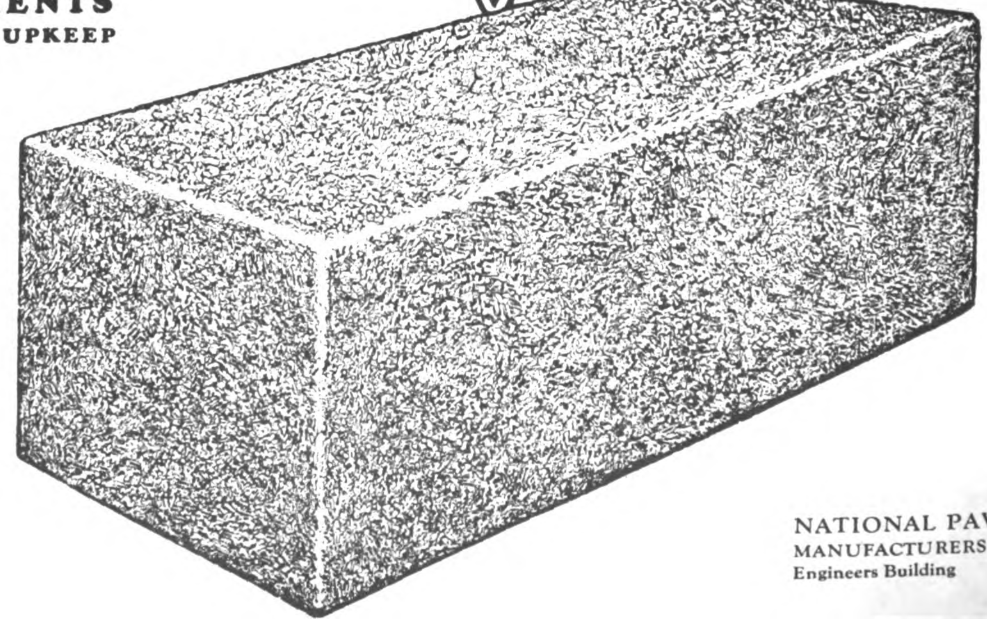

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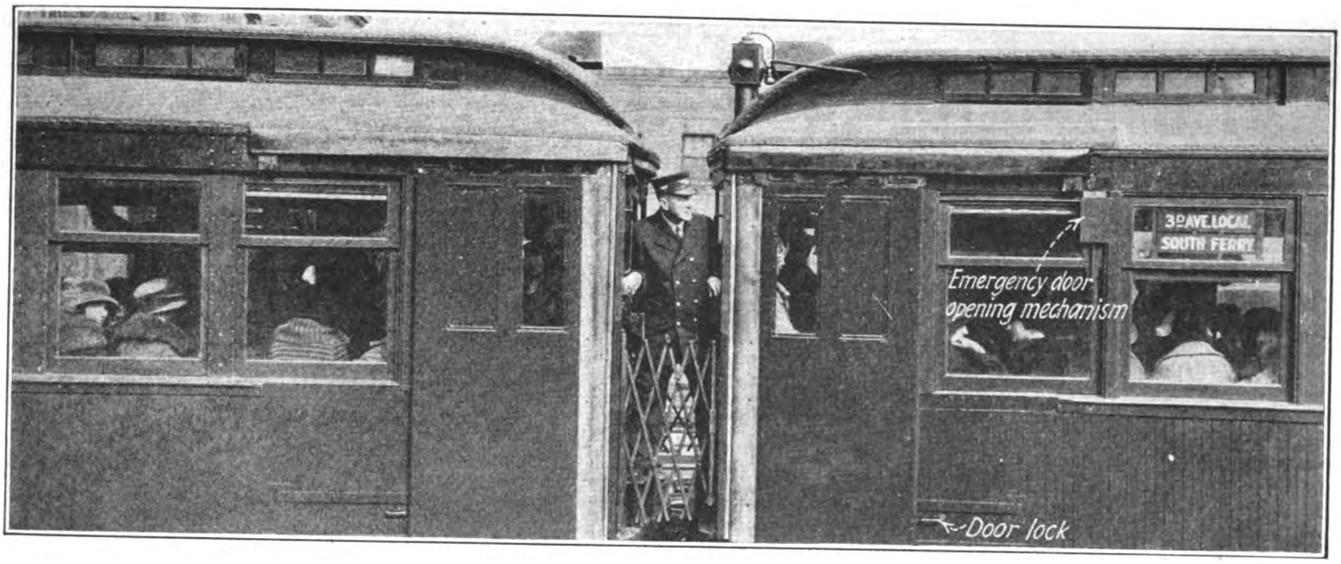

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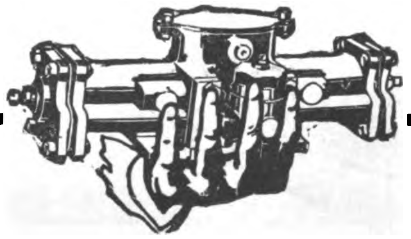

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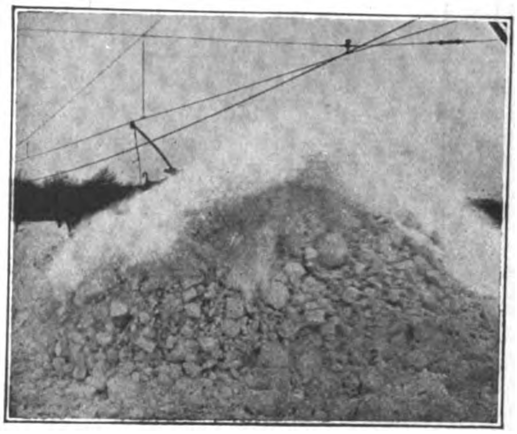

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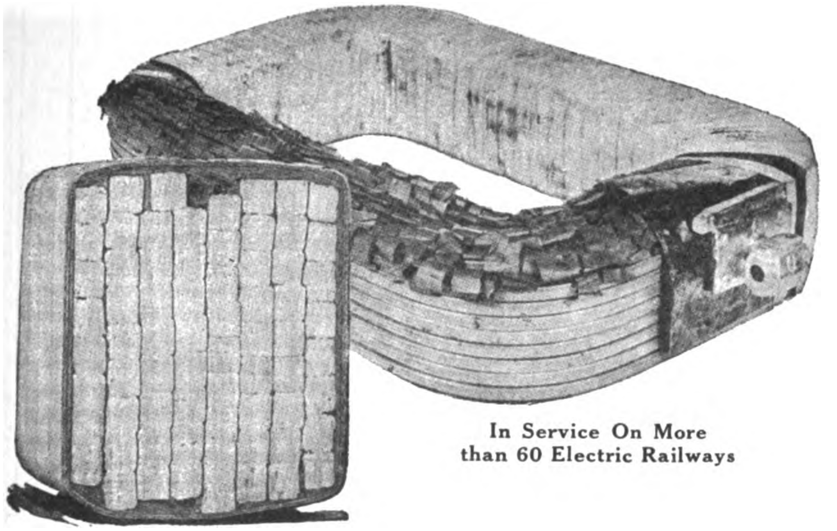

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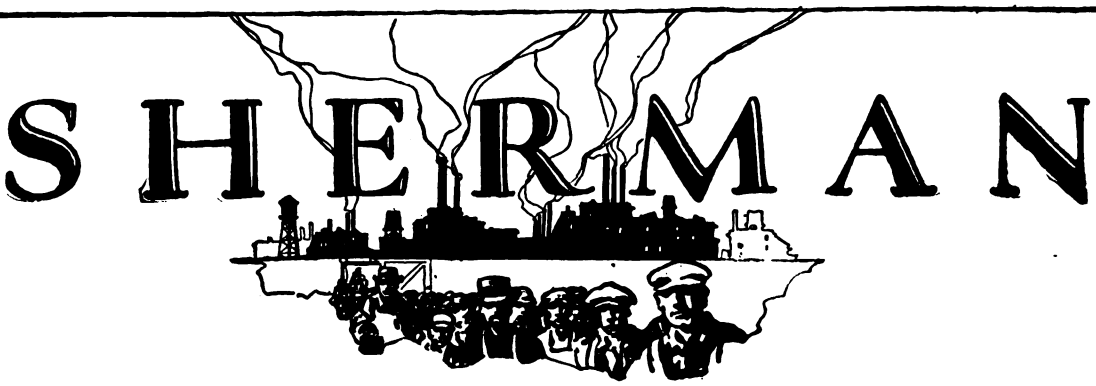

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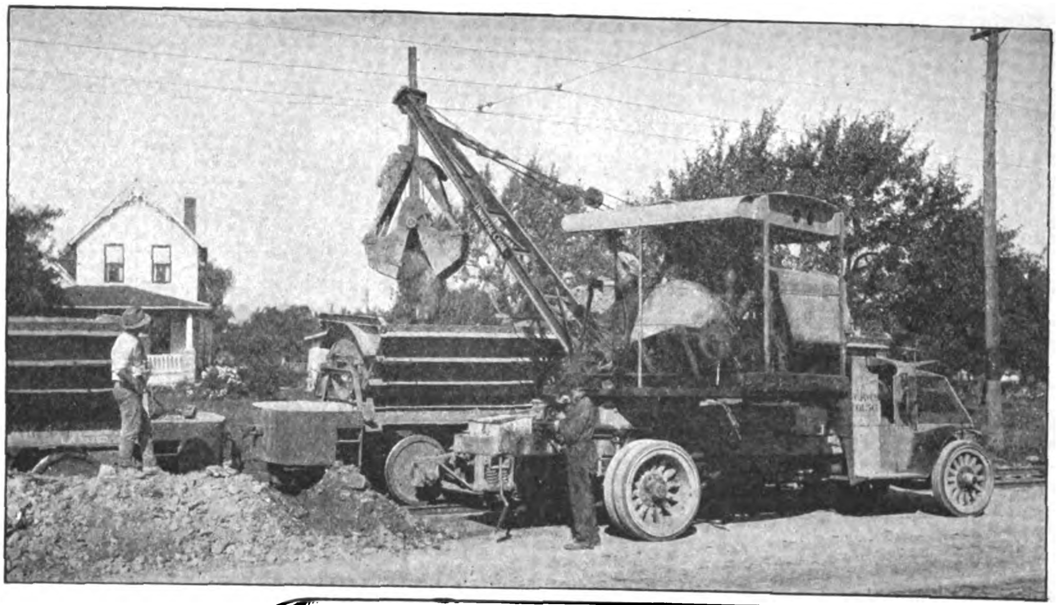
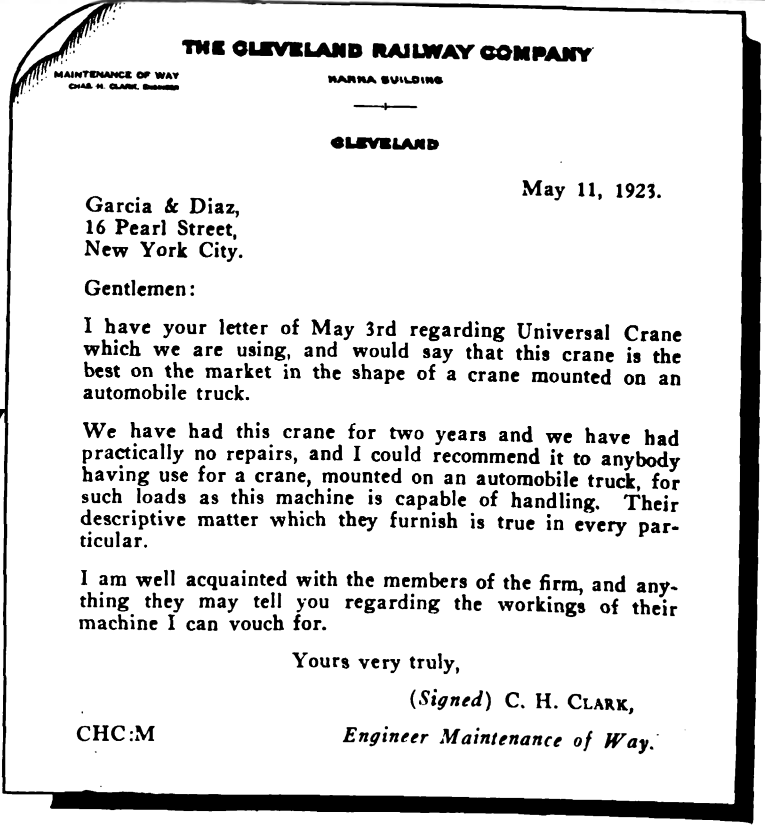


Street Railway Officials

READ THIS



THE CLEVELAND RAILWAY COMPANY

MAINTENANCE OF WAY
CHAS. H. CLARK, ENGINEER

HANNA BUILDING

CLEVELAND

May 11, 1923.

Garcia & Diaz,
16 Pearl Street,
New York City.

Gentlemen:

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We have had this crane for two years and we have had practically no repairs, and I could recommend it to anybody having use for a crane, mounted on an automobile truck, for such loads as this machine is capable of handling. Their descriptive matter which they furnish is true in every particular.

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Yours very truly,

(*Signed*) C. H. CLARK,

CHC:M *Engineer Maintenance of Way.*

Garcia & Diaz asked the Cleveland Railway Company what they thought of the Universal Crane. Here is their answer.

Every street railway in the country can save money on construction and repair work by using these motor truck mounted cranes. Let us explain. Write for Bulletin 22-J.

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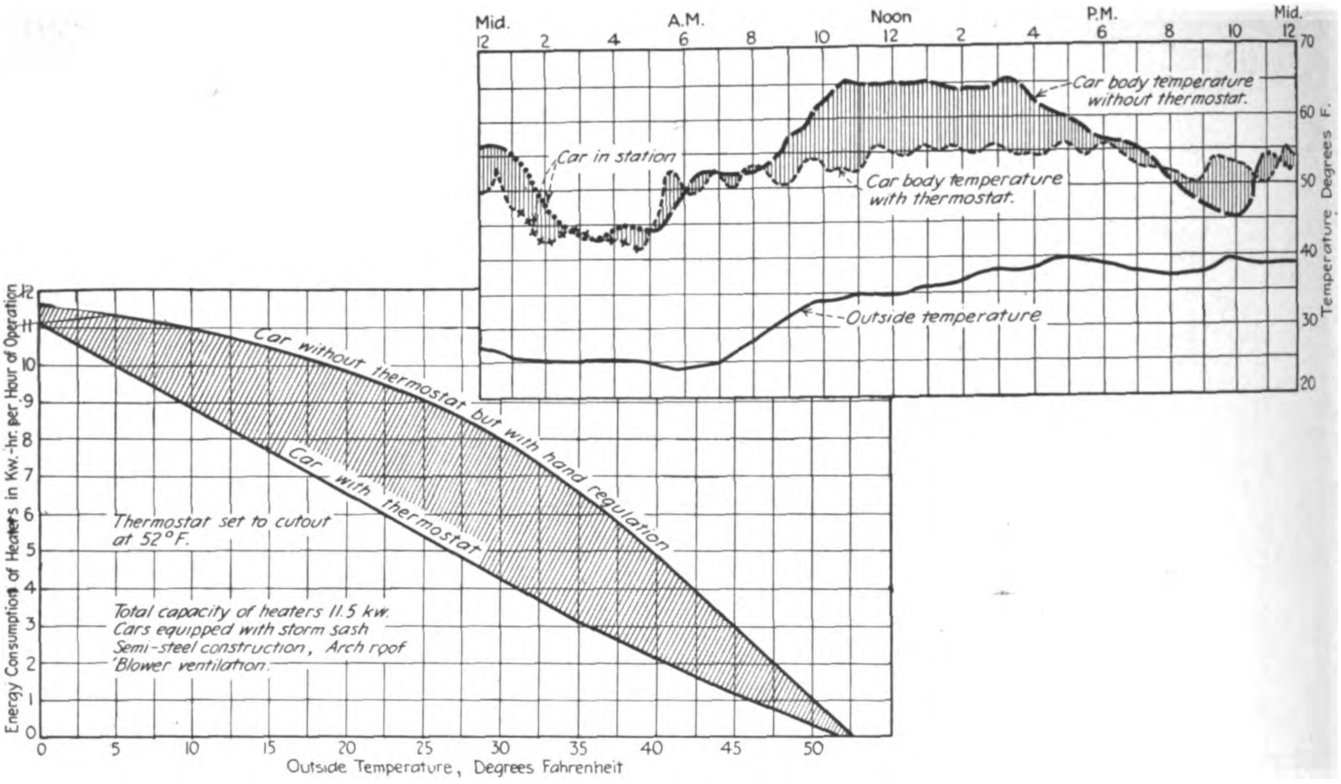

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From page 176 of your G-E Catalog

Your Text Book on Equipment Standards

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New York, Saturday, December 15, 1923

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review
Published by McGraw-Hill Company, Inc.
HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 62
Number 24

Cost of Repair Parts Varies with the Times

RECENTLY, in discussing with an electric railway shop superintendent the advisability of the railway manufacturing for its own use various car parts made up in small quantities, he said that a check of costs which had just been completed showed that several parts previously made in the shop at a saving could now be bought outside cheaper. So orders were to be placed for them.

Labor and raw material prices are constantly changing, and what is economical repair shop practice at one time may be found to be costly at another. The margin of saving between making repair parts in an electric railway shop and purchasing them outside is frequently quite small and railways often make parts as a matter of convenience rather than take a chance of slow delivery. A frequent check of manufacturers' prices with the shop costs will show whether it is advisable to continue to make them or place orders with a manufacturer.

As manufacturers specialize in manufacturing work, and as they usually keep their plants equipped with the most modern labor-saving machines on account of trade competition, it ought generally to be possible for them to do such work cheaper than it can be done in an electric railway shop which is organized and equipped for maintenance work, and often has old tools to work with. Abnormal conditions may make railway manufacturing desirable at times, but a watchful eye should be kept for the opportunity again to buy maintenance parts outside more cheaply.

Cleaning Done Right Contributes to Low Maintenance

IMPROVED appearance and better sanitation are desirable aspects of good car cleaning, but a more important result is the contribution this makes toward preservation of the car structure. The importance of cleanliness has increased considerably with the greater use of steel car construction. Corrosion is the greatest enemy of steel and iron and the best protective coatings have their usefulness decreased enormously by lack of attention in keeping all parts clean.

Working to meet this maintenance problem, special consideration has been given in car construction to avoid pockets and crevices which collect dirt and moisture. Sanitary corners have been provided, moldings and projections are beveled and seat pedestals are made with well-rounded bases. But these precautions merely make cleaning easy and are of little help in eliminating corrosion unless the cleaning is actually done. The dirt which collects retains moisture. This combination forms an acid which accelerates corrosive action, where steel is used, or soon rots away wooden construction. The corners are the hard parts to keep free from dirt, but they are the important points, if maintenance costs are to be held to a low figure.

Making Air Tanks Safe at Reasonable Cost

A GREAT deal of attention has been directed recently to the need for establishing definite specifications for the construction of electric railway air tanks. A committee of the American Electric Railway Engineering Association has been working on this subject and has been co-operating with a sub-committee of the American Society of Mechanical Engineers, which is engaged in the preparation of a code for the manufacture of unfired pressure vessels. This code will probably include electric railway air reservoirs.

Primarily, the object of such specifications is to insure safety. The railway companies should be, and are, in entire accord with this object, and it is to be hoped that the work under way will result in the production of a code which will not only assure safety but will also avoid saddling upon the railways an unnecessarily expensive and heavy equipment to be hauled around throughout its life.

The interest of railways goes farther than providing a construction that will be safe when first installed. In addition, the construction of air tanks for electric railway service should be such that easy, systematic and regular inspection and tests can be made. These are necessary in order to be sure that the deterioration resulting from service has not weakened the tank to a points where blowouts are likely to occur.

The present inspection and test practice of electric railways usually consists of some kind of a pressure test or a close visual inspection of the material of the tanks on the outside after all loose scale and dirt have been knocked off with a light hammer. Some roads apply pressure with a hydraulic pump, but on many roads the pressure test consists only of setting up the safety valves and pumping up the air pressure to an amount considerably in excess of that regularly obtained. Some roads have a practice of periodically rotating the reservoirs so that excessive corrosion will not take place at one particular section of the shell.

The need for an inspection of the interior of the tanks has been felt for some time, but as the usual pipe connections are seldom larger than 1 in., the opening is too small for inspection purposes. A few railways are now using tanks with a 2-in. pipe connection in one head. This makes it possible to examine them internally, as a drop light with small sized lamp can be inserted. With this better means of inspection it should be possible to utilize a lighter gage of metal for the tank than might be considered necessary with only exterior inspection.

In addition to the better facility for inspection, the 2-in. connection can be used to advantage for providing a moisture trap in the air piping to prevent freezing of the condensed moisture at points that will interrupt the air supply.

Due to advances made in welding, a large field has been opened up for the application of this process to air reservoirs. Some engineers have felt that a welded tank increased the hazard, but with provision for careful, systematic inspection and test after installation, no doubt a satisfactory welded tank can be made at a lower cost than a riveted tank (which some members of the A.S.M.E. are inclined to feel is necessary) and perhaps with lower weight, while giving an adequate safety factor.

Having provided for adequate tests to insure safety, why not tell the public about it? It has been suggested that a very effective method of doing this would be to stencil a statement conspicuously on the outside of the tank which would read something like this: "Tested to 1½ times maximum working pressure," accompanied by the date and name of company.

While the general public is not competent to judge as to the frequency with which such tests should be made, a stenciling of this nature would at least indicate that the tank had been tested at some time and it would also serve as an incentive for the railway to make tests well within the proper interval.

Public Beginning to See that Riders Alone Cannot Support Subways

ONCE every so often some one proposes that the elevated roads, or part of them, in large cities be taken down. Scrapping is the word generally used. The obstruction which they cause to light and air on the streets below and to adjoining property is the principal argument urged against the existing structures. During the past week agitation of this kind has again come up, this time in connection with the Sixth Avenue line, New York City. Julius Miller, borough president of Manhattan, has gone somewhat further than has been done with previous proposals of a similar nature and has suggested that the cost of acquiring the structure and building a substitute subway be raised by assessments on abutting property. He believes not only that the increase in value of this property resulting from the change will amount to much more than the entire cost but that the owners of this abutting property would be willing to pay for the change by an assessment. The amount required has been estimated by him at 10 per cent of the assessed value of the property.

Now, it is undoubtedly true that in the course of the growth of a city the methods of transportation in use may have to be changed. Undoubtedly, also, property owners prefer a subway to an elevated railway on the street on which their real estate is located. The elimination of the overhead lattice work of steel girders, ties and rails on Sixth Avenue would improve the appearance of the street and make the ground-floor stores much lighter. With the railway underground there would be a pleasing reduction in noise. It is easy to see, therefore, why the property owners on that avenue favor such a step.

However, grave misgivings may well exist concerning several features of the plan. The estimated cost seems too low by a large amount. The existence of an underground railway, the Hudson & Manhattan, under Sixth Avenue from Ninth Street to Thirty-third Street would seem to impose great engineering difficulties in the design of a new subway. Apparently no detailed estimates have been made of the traffic which would be carried, nor the cost of operation, nor who will operate the line. It has simply been assumed as a matter of course that a Sixth Avenue subway would be a paying proposition.

Actually, of course, a subway is a luxury in any city. Even in Detroit, where the subsoil is ideal for subway construction because it contains no rock but can be cut like cheese, the cheapest form of subway, if supported entirely by the car rider would require a fare of 10 cents or more, according to D. L. Turner. This suggests that at least one good result may come from the campaign on Sixth Avenue, even if the subway is never built. A large number of more or less influential people will learn at first hand something about the intricacies of subway building and its tremendous cost. They will discover the thousand and one things that are required, and to which the average man never gives a thought. And if careful analyses are made of probable operating costs and passenger revenue, these property owners may learn that every railway is not *ipso facto*, a gold mine. The plan is commendable in that Mr. Miller is going about the work in the right way, namely, by placing some part of the cost of the construction on the owners of abutting property. They primarily are the ones benefited. The principle of assessment for rapid transit improvements, suggested also in Mr. Turner's report on Detroit as presented in this paper last week, is logical.

Finally, it is evident that even if the campaign for funds among Sixth Avenue property holders is successful, New York cannot dispense now with the carrying capacity of the Sixth Avenue elevated. The city is ten years at least behind in its transit program. If the building of a subway under Sixth Avenue takes five years the elevated will have to remain in place for at least that length of time because the other present north and south rapid transit lines have not the excess capacity required to accommodate the passengers who now use the Sixth Avenue elevated. After a Sixth Avenue subway is built, it may be that the elevated over the street will not be required, but if history is any guide, New York City will need for many years all of the rapid transit lines which it has now and can build to care for its constantly increasing traffic.

This condition, that the means of transportation is a step behind the demand, applies in every growing city, and is one of the safeguards of the electric railway. Thus there have been statements in the past that the surface lines in New York were obsolete and should be scrapped. Nevertheless, they carry now about 39 per cent of the local business of the city, as compared with 59 per cent on the rapid transit lines and 2 per cent by buses, and there is no other way known of taking care satisfactorily of this large proportion of the traveling public. In other words, good transportation in a city is a necessity, and a city cannot get along without electric cars in its principal streets until a better means for local transit is provided. This seems a long way off.

Use of Mold Successful in Arc Welding Copper Rail Bonds

Two Methods of Arc Welding Are Described—The First Employs a Carbon Electrode and the Second a Copper Alloy Rod—Figures of Numerous Bond Tests Are Given —Procedure Has Been Developed as a Result of Research Covering Three Years

By Chester F. Gailor
Consulting Engineer, New York City

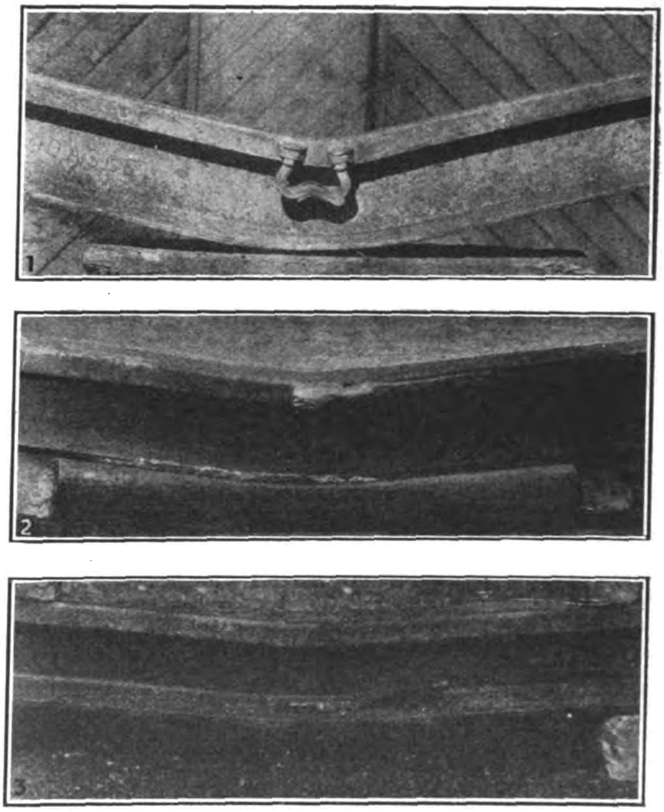
ONLY recently has the practice of arc welding bonds to rails been accomplished in a reliable and satisfactory manner. The first attempt to arc weld copper bonds to rails was made by using, both for the bonds and the filler needed, pieces of old trolley wire welded by the carbon arc method. It was considered necessary at that time to secure deep penetration into the rail steel to produce a desirable weld. This caused unnecessary gouging and burning of the steel, and usually resulted in an ugly looking weld of questionable character. A careful study of the factors involved demonstrated the fallacy of this practice and resulted in the development of a welding process which eliminates that feature.

Many attempts have been made to manufacture a rail bond with a suitable terminal which could be satisfactorily welded to the rail without the use of a mold. This has been found very difficult because the copper, in a fluid state under the influence of the arc, does not amalgamate readily with the steel. Copper in such a small mass usually will chill without producing a weld. The use of molds, however, has made it possible to use sufficient copper around the bond to produce a reliable weld and at the same time form a suitable terminal on the bond.

The problem of confining the weld metal and the necessity for producing a weld and bond terminal of a suitable character prompted the use of a mold. It was soon found that a carbon mold met the requirements better than any other material. Carbon will withstand the action of the arc and erosive action of the metal when boiling in the mold and will not chill the metal as rapidly as will most other materials. Consequently, a carbon mold in one form or another has been in use since the very beginning of this method of bonding.

It was found difficult to produce a satisfactory weld in the remote corners of the mold, especially on the smaller sizes of bonds with limited area of contact. In some cases where molds of other materials than carbon were used for experimental purposes, it was found difficult to force the copper metal into the corners of the mold, as the material had sufficient chilling and repulsive action to hold the copper back for an appreciable distance from the corners. This indicated that acute angles in the mold and thin sections of copper welding should be avoided.

The carbon molds are designed to produce a terminal and welded contact to the rail equal to at least four times the cross section of the copper metal in the bond itself. With this area it is virtually impossible for an operator to apply a bond which when finished will not test 100 per cent efficient. A larger contact terminal could not be justified.



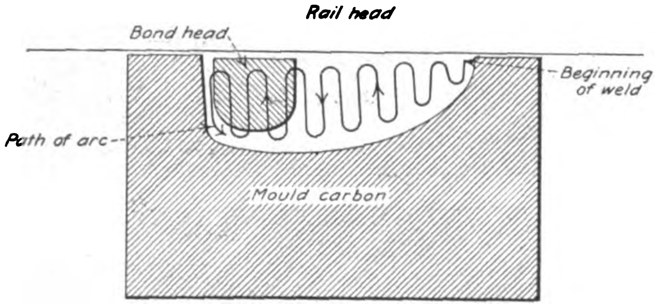
Condition of Rails and Bonds After Being Subjected to Severe Drop Tests

During the study it was found that a combination of copper, steel and carbon for the mold was most desirable. It developed that the mass of carbon needed around and under the head of the bond was considerably more than the space available between the finished bond terminal and the top, which many heavy-section joint plates now in use, would permit. The combination of these materials, however, enables the bond to be applied at a point on the rail head much lower than if an all carbon mold were used.

The life of such carbon molds of course depends largely on the welder. A set of carbons will, as a rule, weld forty or fifty bonds. When the speed of the operation is considered the use of molds is fully justified.

Investigation and research conducted principally in the laboratories of the Rail Welding & Bonding Company resulted in the development and perfection of two different methods. One method is by the use of the carbon arc including the use of reversed polarity, with the carbon electrode negative. Instead of using scrap copper for an electrode, a copper alloy welding rod is employed, which contains a combination of metals acting as a strong deoxidizer for both steel and copper. Under the influence of the arc this will thoroughly cleanse the steel surfaces, bringing pure copper into contact with the steel in the rail under the most favorable conditions.

This action of the copper alloy rod obviates the possibility of gouging the rail steel. In fact, the best bonds are produced where the arc is drawn along the surface of the rail steel, close enough to secure the desired weld, but still far enough away to avoid any direct penetration. The action of the copper metal in the mold under the influence of the arc is very similar to that of copper when handled in a crucible. All the foreign substances and slag rise to the top, leaving the pure copper forming the bond terminal welded to the rail. This method is recommended in all cases where dynamotors and similar low voltage generating units supply the necessary electric current. The total time for welding a bond of the ordinary standard size and type is approximately two minutes. Where conditions are sufficiently favorable bonds may be installed in half the time. It has been found very essential that sufficient current be available to keep the copper metal flowing uniformly and the metal in the mold always in a fluid state. Otherwise, the metal will chill, preventing the cleansing and boiling action, which is highly necessary. In practice at least 200 amp. are required to weld bonds successfully with this method.



Path Which Arc Should Follow in Welding Bond

METALLIC ARC WELDING

The second method of bond welding, which is the result of a research started about three years ago, is distinctly different. In this the welding metal must all be kept in a molten state and the length of arc changed from time to time to produce a good weld. The same molds and accessories are employed as in the first method. The current usually is supplied by a lightweight portable resistance welder, a $\frac{3}{16}$-in. diameter copper alloy rod forming the positive electrode.

The resistance should be set to permit a current of about 225 amp. The weld is commenced at the end of the mold remote from where the bond head projects into it. The arc is struck by touching the electrode to the mold. A globule of melted copper will start to form at the end of the mold and the arc should be kept at the front edge of the globule, allowing it to enlarge until the entire bottom of the mold is covered. An arc of about ¼ to ⅜ in. in length is ordinarily used at the beginning of the job. As soon as the arc touches the bond head it should be shortened to ⅛ in., as the short arc is necessary to melt down the copper of the bond head properly. After the bond head is melted down the arc is played back and forth and in and out from the rail over the entire head to keep all the copper in a molten state and insure that the head is well filled out in back and properly welded to the rail. This procedure is followed whether the bond is applied to the head, web or base of the rail. When applying the weld to the base a slightly longer arc, ⅜ to ½ in., is used at the beginning to fill the mold.

MECHANICAL TESTS

During the development of the process it was found necessary to make mechanical tests in order to establish the principles involved, and also to get some idea of the comparative life of the various types of bonds. The vibrating machine used for testing bonds mechanically consists of a steel framework carrying two upright standards mounted on 'eccentrics in such a manner as to give a maximum movement of $\frac{11}{32}$ in. between the two members. The bonds were welded to pieces of steel and inserted between the two upright members and the machine operated continuously until failure occurred. This movement, being far in excess of that resulting from actual practice, was adopted in order to speed up the operation. A summary of several of such tests is shown in an accompanying table.

Several methods of testing the strength of the bond heads when subjected to shearing stresses such as are apt to be imposed upon bonds welded to the head of rails were tried with varying results. The most valuable of those tried was a simple shear test to show the relative strength of the weld and the copper forming the bond terminal. This test clearly indicates the merits of the weld, as the loads required to shear the bond terminals all ran over 30,000 lb.

The use of a sleeve at the junction of the bond head and bond itself was shown to be very valuable. This sleeve and the head on the bond itself hold the strands and laminations in one solid mass, preventing the welding heat from overheating any individual strand and at the same time throwing the bending action back into the flexible portion of the bond. This particular feature was found to add practically 25 per cent to the life of the bonds.

ELECTRICAL TESTS

Reliable resistance tests of welded bonds were difficult to make, as it was found after a preliminary investigation that there are very few instruments available which could accurately measure the resistance in the contact between the welded copper bond head and the rail steel. The following is a brief summary of resistance tests which include 1 in. of steel at each bond head and the bond itself. No fish plates or mechanical connections were used so that these results show the actual resistance of the bonds enumerated in the accompanying table.

RESULTS OF MECHANICAL TESTS OF WELDED BONDS

Size	Type of Bond	No. Vibrations Before Failure of Bond
7-in	0000 laminated U	5,100,000
9-in.	0000 Webber U	2,403,000
8-in.	Single cable U	1,830,000
8-in.	Double cable U	1,050,000

RESULTS OF ELECTRICAL TESTS OF WELDED BONDS

Size	Type of Bond	Ohms Resistance
6-in.	0000 laminated U	.0000389
7-in.	0000 laminated U	.0000493
8-in.	Webber	.0000454
8-in.	Single cable U	.0000516
8-in.	Multiple cable U	.0000484
8-in.	400,000 circ.mil single cable U	.0000260

Careful consideration was given to the study of the rail steel at and adjacent to the point of weld. The idea of securing even the usual penetration when making a bond weld was found not only decidedly wrong from a bonding point of view, but it created a condition that proved liable to cause failure in the rail section when mechanical tests were conducted. The improvement in the process of welding, as outlined herein, quickly eliminated this feature, by making it both unnecessary and improper to penetrate the steel with the arc.

Among many other tests which were conducted to prove that the welding of copper bonds to steel rails with these processes of welding did not weaken or materially affect the structure were severe drop tests made on extra high carbon tee rails by dropping the 2,000-lb. tup so as to strike the rail at the point of weld. No failures or indications of any objectionable character were in evidence at the conclusion of these tests. The rails were removed from the testing apparatus because of the excessive vertical deflection which caused the rail to rest on the bed of the machine.

Aside from the area heated during the welding, which was in no way damaged, there was no evidence of any change in the structure of the steel or the rail section itself.

Systematic Inspection Reduces Pull-Ins

THERE has been a steady reduction in equipment failures, covering a period of several years, on the Eastern Massachusetts Street Railway, formerly the Bay State Street Railway, which operates 665 miles of city and interurban lines. This dated back to the reorganization which placed the road under state control with operation by a board of public trustees. An accompanying table shows a reduction from a maximum of 1,489 pull-ins due to equipment failures in July, 1920, to 92 in July, 1923.

This marked improvement in the record in three years is due to numerous changes in methods, but according to W. C. Bolt, superintendent of rolling stock and shops, they all can be summarized in the words "systematic maintenance and inspection."

Cars are given a general shop overhauling at between 60,000 and 75,000 car-miles, depending on the type and age of cars. Between these general overhaulings the cars are inspected every 1,000 miles at the carhouse for minor adjustment and repair. It is stated that this plan, vigorously followed, has made it possible almost to eliminate failures of equipment in service and substantially to reduce the cost of maintaining cars.

The comparative record of pull-ins by operating divisions for the month of October, 1923, shows considerable difference in the records of the various parts of the system. Two of the smaller divisions had perfect records for the month, and two of the larger stations had but one pull-in each due to maintenance, averaging 0.007 pull-ins of this character per 1,000 car-miles. From this the number of pull-ins for the various divisions ranges up to a maximum of thirty-six, or 0.184 maintenance pull-ins per 1,000 car-miles.

Publication of the monthly record is said to have created considerable competitive interest, and has been a contributing cause to the present good record. Equipment failure pull-ins are also analyzed carefully each month, as indicated in another table. The company makes this record up for each operating division, although only the total is shown in the table. This enables the department heads to determine the causes that result in car failures and to eliminate the sources of trouble.

PULL-IN REPORT, EASTERN MASSACHUSETTS STREET RAILWAY
MONTHS OF SEPTEMBER AND OCTOBER, 1923

Cause of failure	Number of Pull-Ins October	September	Increase
Contactors	6	3	3
Circuit breakers	0	1	1*
Air	8	20	12*
Car body	6	5	1
Controllers	8	12	4*
Doors and steps	11	13	2*
Wheels	0	0	..
Air and hand brakes	4	8	4*
Gears and pinions	1	3	2*
Hot bearings	12	12	..
Lights	16	6	10
Sanders	0	2	2*
Armatures	8	13	5*
Fields	3	5	2*
Miscellaneous motor	2	7	5*
Wires and cables	14	5	9
Trolleys	6	4	2
Trucks	1	3	2*
Resistance	20	17	3
Grounded brush holders	2	1	1
Fenders	0	1	1*
Miscellaneous	3	5	2*
Broken axles	0	2	2*
Heaters	1	0	1
Split mercury	0	0	..
Frozen air	0	0	..
Sand boxes empty	1	6	5*
Lightning	0	1	1*
Broken windows	15	8	7
Accidents	53	62	9*
Lights (operating pull-in)	0	0	..
Inspections	4	1	3
No trouble found	20	17	3
Wet sand	1	2	1*
Total pull-ins	226	245	19*
Operating pull-ins	94	97	3*
Maintenance pull-ins	132	148	16*
Station car-miles	1,639,527		
Maintenance pull-ins per 1,000 car-miles	0.08		

* Indicates decrease.

RECORD OF EQUIPMENT FAILURES BY MONTHS, EASTERN
MASSACHUSETTS STREET RAILWAY

Month	Pull-Ins Due to Equipment Failures	Pull-Ins per 1,000 Car-Miles
May, 1920	1,238	0.60
June	1,364	0.66
July	1,489	0.70
August	1,389	0.68
September	1,022	0.54
October	1,182	0.63
November	1,071	0.61
December	941	0.54
January, 1921	1,192	0.72
February	1,069	0.74
March	948	0.57
April	700	0.44
May	715	0.43
June	628	0.38
July	1,060	0.59
August	1,049	0.57
September	916	0.56
October	734	0.45
November	758	0.49
December	653	0.40
January, 1922	1,048	0.66
February	827	0.56
March	612	0.37
April	437	0.28
May	312	0.19
June	271	0.17
July	287	0.16
August	274	0.16
September	246	0.15
October	188	0.11
November	163	0.10
December	313	0.19
January, 1923	560	0.34
February	501	0.33
March	559	0.33
April	250	0.15
May	172	0.10
June	111	0.07
July	92	0.055
August	105	0.063
September	148	0.093
October	132	0.08

Reclamation Storeroom Accomplishes a Big Saving*

The System Developed by the Northern Texas Traction Company for Reclaiming Waste Material Has Improved Efficiency of Mechanical Department and Reduced Expenses

ON MANY railway properties thousands of dollars a year have undoubtedly been thrown away via the junk pile. Further losses have resulted from lack of a system whereby a single person passes on all material before it is scrapped. If so-called waste material is examined to see whether or not it can be reclaimed and restored to usefulness, large savings can often be made in material which would otherwise be drawn from stores.

This problem was the subject for discussion at a meeting of the master mechanics of the Stone & Webster companies some time ago. As a result of this discussion, it was decided that the Northern Texas Traction Company, Fort Worth, should experiment with the establishment of such a department.

A survey was made of conditions at the shop and it was found that material and spare parts were lying around everywhere. This material had been taken off the cars from time to time and left there with the idea that it would be used at some future date. Time and effort were being lost, however, in looking for what was wanted and, in a great many cases, material was requisitioned from the storeroom when a thorough search would have discovered the desired article in some corner of the shop. This was the inevitable result of having no centralized place equipped for handling second-hand material and reissuing it. Moreover, it was felt that proper examination was not being made before material went to the junk pile.

A section of the truck shop 40 ft. x 36 ft. was therefore partitioned off and some 350 shelves of various sizes were built. Scrap cupboards, waste bins, spare controller racks, glass racks, 560 small bolt bins and an armature rack were placed in this room. A work bench was installed and equipped with a vise, compressed air connections and other tools for reclaiming material needing minor repairs. Surplus material and spare parts were collected and moved into this room, assorted and put away. The room thus assumed the appearance of a storeroom, although all the material belonged to the mechanical department and not to supplies.

A man who had had previous experience in the storeroom, as well as in the shop, was placed in charge of this reclamation room under the supervision of the master mechanic. Another man was kept busy scrapping material, stripping good parts from junked material and making minor repairs. The latter man, with the assistance of the general foreman, determines whether or not worn parts that are brought in are worth reclaiming. When they are, they are taken to the department where the repairs are made, and then returned to the reclaiming room for reissue. A third man, who is an all-around mechanic, puts in a portion of his time in this department, making miscellaneous minor repairs.

A rule was made in the mechanical department that if any man in any department needs material or parts, he must first apply to the reclamation room to ascertain whether or not the material desired is to be had there. If not, the man in charge of the room has authority to write a requisition on the general storeroom. By this plan the general foreman is relieved of much detail work.

The establishment of this department has resulted in saving time in the reassembling of cars and in furnishing more accurate jobs. When cars are brought into the shop for overhauling all parts are removed, repaired and stored in this room. When the car is completed the same material is placed back on the same car, after, of course, it has had the necessary attention.

It is impossible to place a monetary value on some of the benefits derived from the establishment of this department, such as relieving the foreman of detail work and permitting him to give closer attention to other duties, relieving congested conditions in the storeroom and reducing the amount of clerical work in that department, and systematizing the use of material, both new and used. In some other respects, however, the saving in dollars and cents is quite apparent. A check made of the orders for March, 1923, showed that about 56 per cent of the calls for material were supplied by the reclamation room. But it is felt that the other benefits derived from it would be well worth while even with no saving at all in money.

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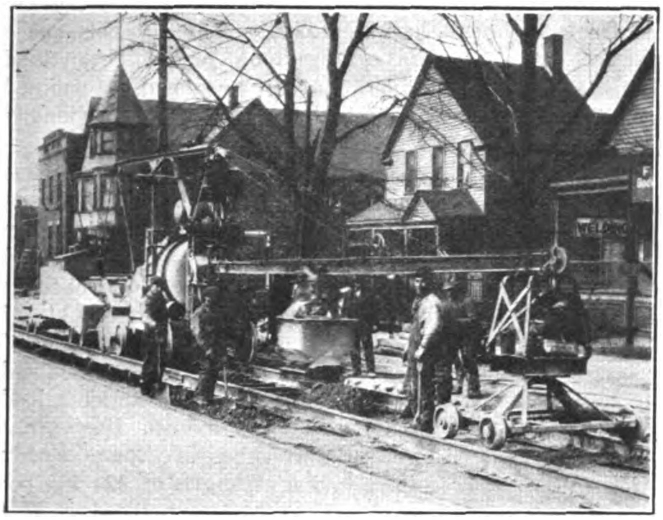
*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association.

Repairs to Car Bodies Principal Expense Item in Railway Shops

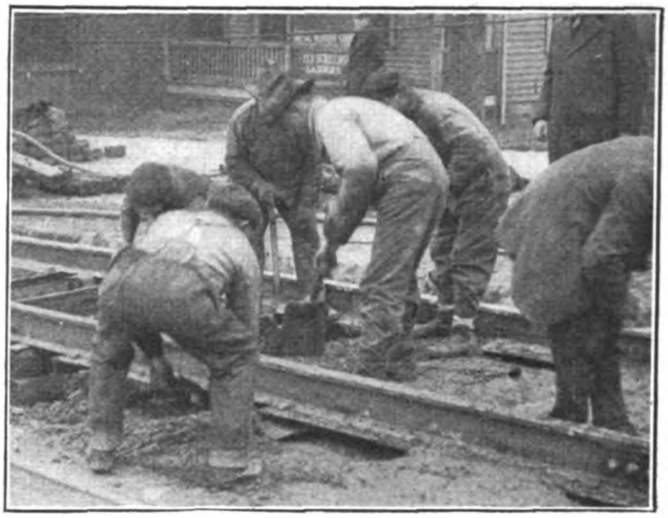
FIGURES recently made public by the Department of Commerce show that nearly 80 per cent of the money value of work done in electric railway shops is expended in repairs to cars. In 1921 the sum of $69,131,546 was spent in this way. Repairs to motors, etc., was the next largest item, but the expenditure on this account amounted only to $7,226,905. A total of 177 cars, including passenger, freight and others, was built in electric railway repair shops, but the value of the equipment was only slightly more than $1,000,000. It appears that the railways are generally following the practice of using their shops for maintenance work and going direct to the manufacturer when they want new cars.

		1921	1919	1911	1909
Motive power and machinery departments:					
Repairs to motors, etc., value		$7,226,905	$7,081,735	$4,933,436	$4,004,396
Work for other corporations, value		$78,472	$75,182	$56,944	$88,070
All other products or work, value		$409,667	[1] $769,386	[2] $390,193	[3] $417,926
Car departments:					
Cars built	Passenger— Number	127	88	235	129
	Value	$822,398	$635,770	$737,926	$498,709
	Freight— Number	2	46	11	63
	Value	$7,200	$95,638	$21,196	$59,102
	Other— Number	48	17	58	51
	Value	$418,669	$30,885	$51,982	$68,941
Repairs to cars of all kinds, value		$69,131,546	$60,060,255	$27,628,802	$22,869,777
Work for other corporations, value		$1,249,497	$1,174,282	$441,323	$624,805
All other products or work, value		$3,900,209	$2,240,975	$2,204,814	$1,714,129
Bridge and building departments (shop-work):					
Repairs and renewals, value		$420,445	$261,679	$199,751	$273,581
All other products or work, value		$96,497	$6,976	$234,676	$57,367
All other products and work not classified, value		$3,550,921	$2,777,938	$1,675,522	$1,285,818
Total value		$87,312,426	$75,210,701	$38,576,565	$31,962,561

[1] Includes value of 2 electric locmotives built.
[2] Includes values of 1 electric locomotive built.
[3] Includes value of 3 electric locomotives built.



Pouring the Concrete Track Base and Leaving Openings Under the Tie Plates



How the Concrete Is Distributed and the Under-Tie Openings Made with Shovels

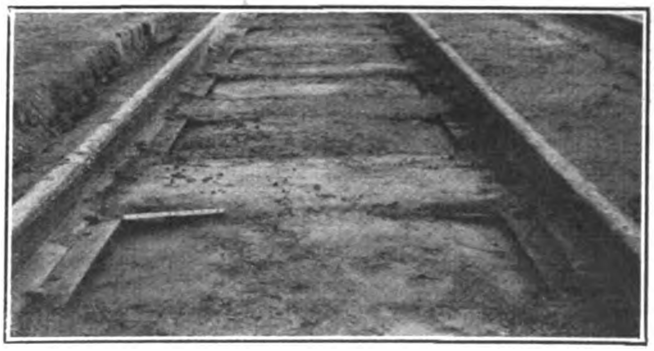
Insuring a Bearing Under Steel Ties

Opening Is Left Under Ties When Pouring Concrete and After It Sets Space Is Filled in with Special Mix and Thoroughly Tamped

THE Cleveland Railway Company has worked out an improved method of placing concrete under steel ties in new track construction. There is always more or less difficulty, under the usual scheme employed, of getting the workmen to tamp the concrete under and around the steel ties to make certain of a complete bearing. Unless the operation of mixing concrete is followed very closely by continuous inspection, the workmen will make the mix too soft, in order to make it flow under the plates easily, and this reduces the strength of the concrete.

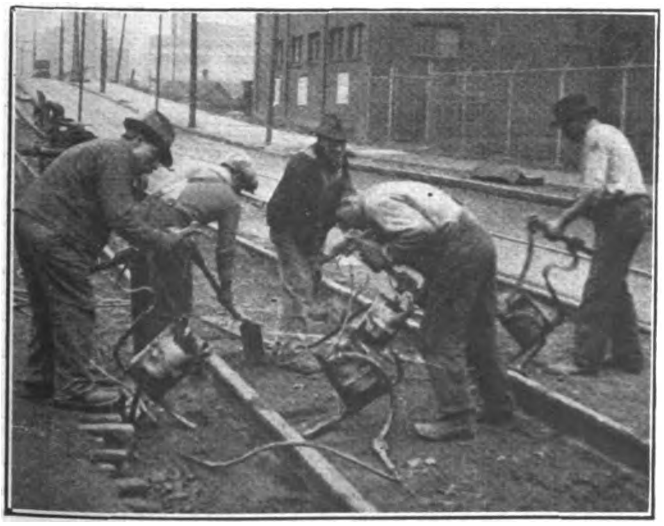
Under the new plan worked out by Charles H. Clark, engineer maintenance of way, a space about 1½ in. deep is left under the tie plate when pouring the concrete base, and this is allowed to set around the channels. After this has set for two or three days, the open space under the tie plates is filled in and tamped with power tampers, the material used being a mix of slag screenings and cement in the proportion of 1 to 3, slightly dampened.

While the concrete base is mixed in a power mixer, as shown in one of the illustrations, the slag screenings are mixed by hand as used. A Jackson electric four-tamper outfit was used for compacting the special mix under the ties.

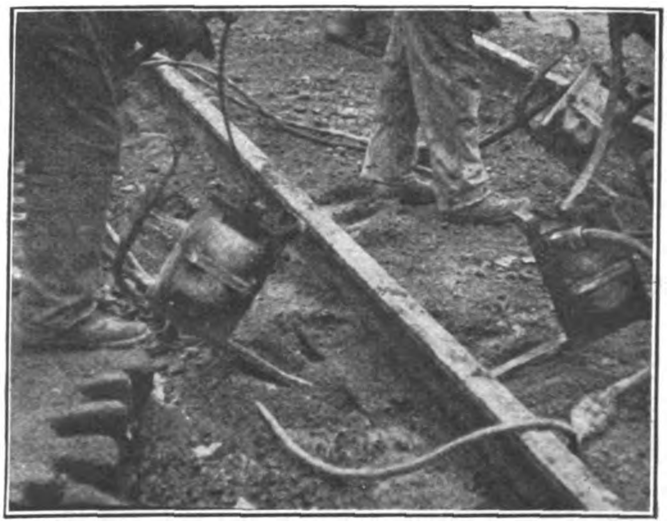


The Concrete Base Is Permitted to Set in This Form for Two or Three Days

This new method of concreting the ties under the bearing plates increases the expense of construction slightly, but the assurance of having the ties in com-



Pouring the Concrete Track Base and Leaving Openings Under the Tie Plates



Closer View of Electric Tamping Tools Working Special Bearing Mix Under the Tie Plates plete bearing more than justifies this added cost, Mr. Clark believes.

The new 102-lb. section 516 rail developed by the Cleveland Railway Company and laid with International steel ties is shown on page 1005 as installed on Quincy Avenue, Cleveland. The rails are given the standard tilt of 1 in 25.

Good Reports of Ciment Fondu Confirmed

Boston Elevated Railway Finds the Tensile Strength to Be Satisfactory at the End of Six Months—The Results of Tests Made in England Are Also Given

TESTS made by the Boston Elevated Railway to determine the tensile strength of Ciment Fondu at the end of six months showed a figure slightly lower than that obtained at the end of three months. The earlier experiments with this material, which is a quick setting cement, were described in the ELECTRIC RAILWAY JOURNAL for Sept. 15, 1923. It was noted at that time that the strength at the end of three months was somewhat greater than at the end of twenty-eight days, although it was not quite up to the strength shown at earlier periods. Although the reports now available show the cement at six months to be slightly weaker than at three months, nevertheless the tensile strength of Ciment Fondu appears to be holding reasonably constant. On the whole the company believes the tests so far made to be most satisfactory. Average figures for the results of these tests at each of the periods noted are given in the accompanying table.

TESTS MADE BY BOSTON ELEVATED RAILWAY

Tensile Strength 1 to 3 Mortar in Pounds per Square Inch

Fifteen hours	Twenty-four hours	Forty-eight hours	Four days	Seven days	Fourteen days	Twenty-eight days	Three months	Six months
302	360	393	457	472	500	413	469	458
280	340	386	445	507	520	455	448	429
315	372	375	482	478	490	433	460	446
Av. 299	357	385	461	486	503	434	459	444

Interesting experiments made in England with Ciment Fondu are described in the Oct. 18 issue of the *Tramway & Railway World.* The tensile strength of neat Ciment Fondu at the end of twenty-four hours was found to be 811 lb. per square inch, as compared with 91 lb. per square inch for neat portland cement of the same age. A mixture of 1:3 Ciment Fondu and sand developed a strength of 573 lb. per square inch at the end of twenty-four hours, whereas a similar mixture of portland cement and sand developed only 11 lb. per square inch. The Boston tests developed a strength of 432 lb. per square inch for neat Ciment Fondu at twenty-four hours. At the end of seven days in the English tests neat Ciment Fondu had a tensile strength of 1,003 lb. per square inch. Mortar in a proportion of 1:3 at the same age had a strength of 612 lb. per square inch. It will be seen that all of these figures are considerably higher than those obtained in the test made by the Boston Elevated Railway. This may have resulted from a variation in the methods of making the tests or in the material.

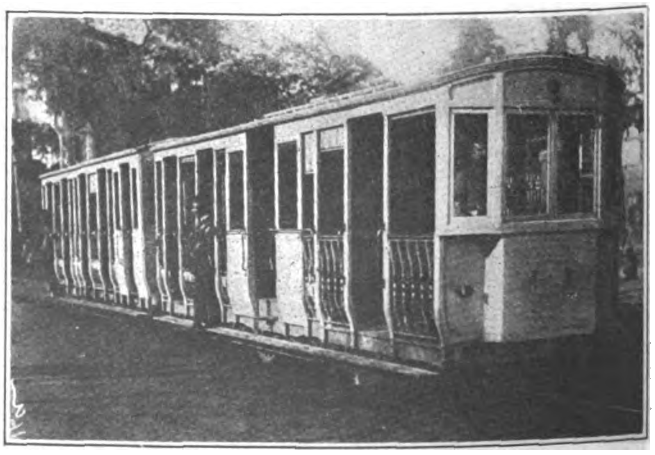
Tests were made to determine the crushing strength of 6-in. cubes of concrete in which Ciment Fondu was used. At the end of twenty-six hours a strength of 7,930 lb. per square inch was developed, and at the end of ninety days this had increased to 9,100 lb. per square inch. From records of previous tests of portland cement concrete at ninety days it has been determined that 5,000 lb. per square inch represented exceptionally good performance.

Heretofore Ciment Fondu has been used in the same proportion as portland cement, but experiments made in France indicate that it is in reality not necessary to use as much of the new material as of portland cement. The mixture used there consisted of 800 liters of gravel and 400 liters of sand mixed with 300 kg. of portland cement and with either 300 kg. or 200 kg. of Ciment Fondu. The cubes made with the portland cement at the end of three months broke under a load of 155 kg. per sq.cm., while at six months they broke at 163½ kg. per sq.cm. Similar cubes of Ciment Fondu at the end of three days had a strength of 324 kg. per sq.cm., or nearly double that of the portland cement concrete at the end of three months. At the end of three months this value had increased slightly. The weaker mixture containing 200 kg. of Ciment Fondu developed a strength at the end of three days of 242 kg. per sq.cm.; at three months 252 kg. per sq.cm., and at six months 257 kg. per sq.cm. This cement is now being used in construction work by the city of Paris, the P. L. M. Railway and the Ouest Railway.

Not only its quick setting qualities, but also the fact that a smaller quantity can be used as a substitute for portland cement, make Ciment Fondu a material of particular interest to electric railways for use in track construction.

The author of the article in the *Tramway & Railway World* says that once its practical advantages when used on a large scale are established it will have a revolutionary effect on concrete construction works of all kinds.

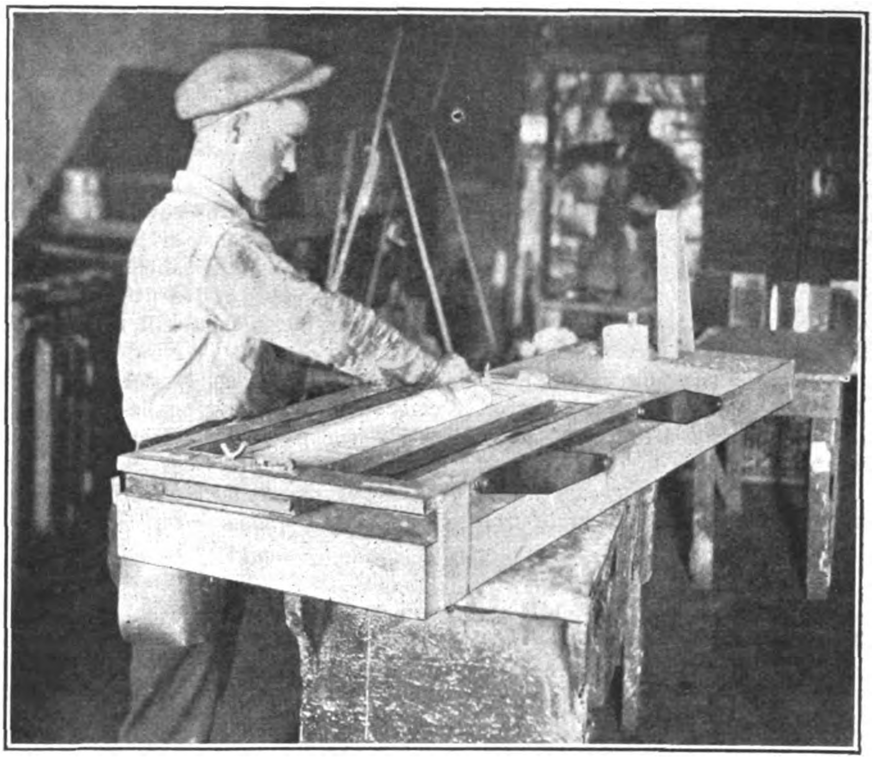
A Modern Electric Train in Cairo, Egypt



These Egyptian motor and trailer trains may not compare in capacity with American rolling stock standards, but they probably are superior in the speed with which they can be loaded and unloaded—judging by the number of doors rather than the characteristics of the people.

Good Results from Lettering Signs by Silk Screen Process

Details Are Given for Making Stencils and Frames, for Mounting to Save Time and Labor, for Applying the Color, Making the Squeegees and for Handling and Drying the Signs After They Are Lettered



Squeegeeing White Lead Through Silk Screen Stencil in Sign Lettering Work

ALL electric railways use signs in considerable quantities and must reletter them at quite frequent intervals to keep them in readable condition. In addition, the publicity campaigns which are now such an important part of the work of many railways require posters and cards in such quantities that careful attention must be given to their production.

Many methods for lettering are used by the sign departments of electric railways. A common one consists of first laying out the letters on cardboard and perforating this so that by forcing white lead through the perforation outlines of the letters are obtained on the sign surface. The letters are then filled in by hand. Where the same lettering is used in large quantities or at regular intervals stencils are frequently made with the letters cut out. Then by going over these with paint and a brush the letters are placed on the sign. With this method some lines are left on the letters which require filling in by hand as the center parts of the letters on the open stencil must be supported. This filling in by hand takes fully as much time as the stenciling.

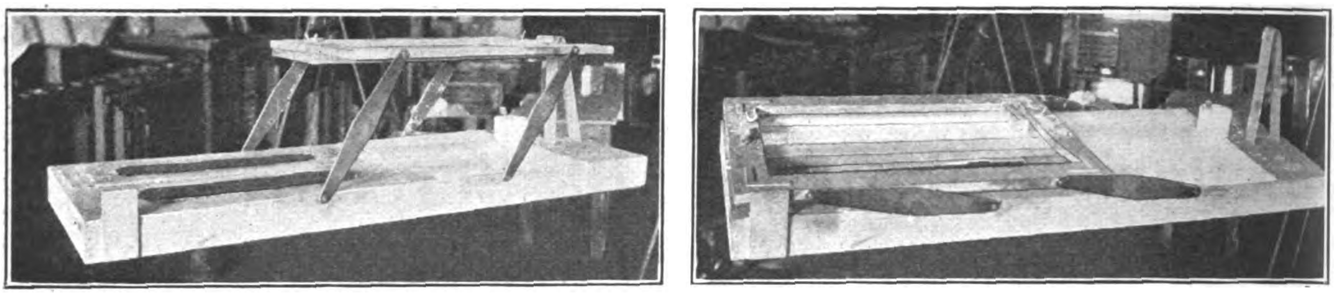
To overcome some of these difficulties and reduce the time and labor for lettering, the silk screen process has been developed. It has several advantages over the stencil and hand process. There is a marked saving in the time required to complete a job, and as the lettering produced is built up, it has a far higher visibility than ordinary brush work.

The silk screen process consists of using a stencil of silk with the letters or designs laid out on it and the outline around the design filled in with a "cut-in" solution, so that later in using this as a stencil the paint used for the lettering or design will not pass through the silk where the solution was applied. This process is now being used by a considerable number of electric railways, among which are the Los Angeles Railway Corporation, the Pacific Electric Railway, the Brooklyn-Manhattan Transit Corporation, the Terre Haute, Indianapolis & Eastern Traction Company and the Indianapolis Street Railway. Most of the problems which have arisen in connection with the system have been solved.

The equipment for lettering signs by the silk-screen process consists of the silk stencil stretched on a substantial frame; a mounting to hold different stencils so that they can be quickly placed over the sign while it is being lettered, and raised again so as to insert another sign, and the squeegee for forcing the paint through the stencil and onto the sign. Practices found successful for cleaning the silk, fastening it to the frame, making the frame, filling in around the letters on the screen, and mounting for rapid handling follow. The practice used in the shops of the New York Rapid Transit Corporation for maintaining signs by this process is given as a definite procedure which has worked out satisfactorily.

Various materials have been tried as the fabric on which the design is laid out in this process, but silk bolting cloth has proved preferable to other fabrics. The mesh runs straight, retains its shape and is uniform and even. Considerable strength is also required in order to withstand the strain of squeegeeing the paint through the fabric, and silk bolting cloth holds up exceptionally well. Kress & Company, Brooklyn, N. Y., have made a special study of the desirable characteristics for a bolting cloth to be used with this process and are furnishing much of the material used at the present time.

Before laying out the design, the silk is stretched upon a wooden frame in a manner quite similar to that



Framework for Supporting and Operating Stencil

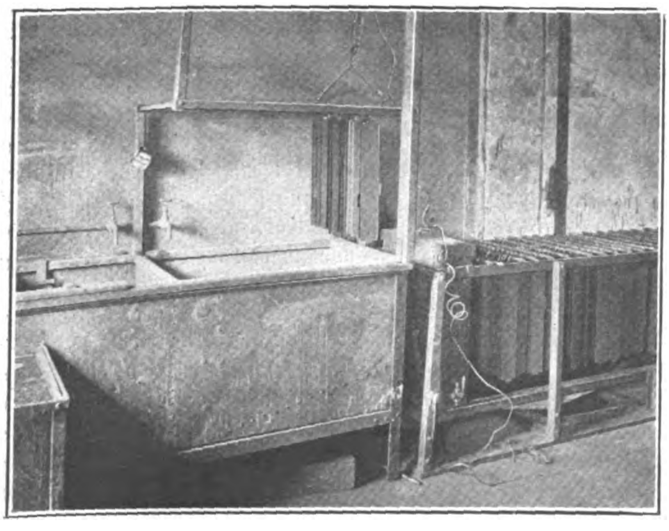
At Left—Raised position with signs in place. At Right—Stencil lowered, ready to receive white lead.

used by artists in attaching canvas. The frame should be made a few inches wider than the size of the design to be reproduced. Some additional space is necessary to hold the paint during the operation. The frame should be made in a particularly substantial manner and well-dressed strips approximately 3 in. x 3 in. have been found quite satisfactory. The corners should be mitered and corner irons used to keep the frame in shape. It is essential that the surface of the silk screen be flat, and so of course the frame must touch on all four sides if properly made. The actual dimensions of the frame will vary with the size of the design to be lettered.

An accompanying illustration shows several signs as used by the New York Rapid Transit Corporation which vary in size from that necessary for a single destination sign to frames about 2 ft. x 3 ft. used for lettering routing and destination signs for operation involving a large number of routings.

PREPARING THE SCREEN

After the silk is stretched tightly, it is quite essential to cleanse it and make certain that all grease or other foreign matter is removed, which may get onto the silk during the mounting operation. This can be accomplished by saturating thoroughly with either hot water, alcohol or benzol. The letters or design are then laid out on the screen. Usually, this can best be accomplished by laying out a sketch on some convenient material and then by laying the frame face down against this sketch, so that the letters can be traced upon the silk with a lead pencil. The traced design is then cut in by either leaving the silk mesh solid and the lettering open or by painting in the design or lettering solid and leaving the mesh open, it being understood that the open portions are the ones through which the paint is forced. A cut-in solution which has proved entirely satisfactory consists of ⅛ lb. of English drop black dry, or bone black dry, dissolved in a quart of good orange shellac, with a tablespoonful of castor oil or other essential oil added to make the shellac pliable so that it will not chip out under the squeegeeing process. The New York Rapid Transit Corporation uses a tablespoonful of powdered black and 1 oz. of glycerine to a gallon of orange shellac. The cut-in solution will thicken while using and can be thinned by the addition of ten parts of alcohol and two parts of castor oil. A pyralin or liquid celluloid solution is sometimes used, but this is not as dependable as the one just given, as it is necessary to coat both sides of the silk. This pyralin mixture, however, is of particular advantage where it is desirable to clean out the screen for other use. This latter solution is made by mixing pyralin red No. 65/5 with a very small quantity of Du Pont thinner No. 12138. A black solution is made by mixing pyralin black No. 67/2 in the same manner. Celluloid solutions are highly inflammable and it is essential to keep them away from open flames.



Equipment Used for Removing Paint and Washing, Dipping and Drying Steel Signs

The potash cleaning tank is shown at the extreme left. Signs are washed in the tank in the center and are then raised to the racks immediately overhead for drying. When thoroughly dry they are dipped in the small tank at the right end of the washing tank. This contains body color for the flat surface of the signs. After this dipping they are placed in the racks at the right for drying.

The cut-in solution is best applied by a small camel hair or sable brush. When working on a flat surface, a bridge or hand rest will be found of advantage. When the design is finished, the frame should be raised about half an inch, so that the silk will not touch the top of the table or bench. Strips tacked temporarily to the end of each frame will give the desired effect. These should be removed as soon as the screen is coated with the cut-in solution. It is almost impossible to coat in with the solution around the edges where the screen rests against the frame. A satisfactory method for protecting these places is by the use of paper glued on and then shellacked. A lining of paper 4 or 5 in. wide can be glued to the inside of the frame so as to extend down over the face of the screen. Several strips of very thin paper will be found to work more satisfactory than a single sheet of thicker paper.

MOUNTING OF FRAME ESSENTIAL

When the frame with screens has been properly assembled, the next essential is an additional mechanism for holding the frame and for moving it into and out of position quickly. For the smaller sizes of frame some sort of a hinged mechanism has proved very efficient. An accompanying illustration shows the mechanism used by the New York Rapid Transit Corporation for holding the smaller sized frames which are used for lettering the steel destination signs in its elevated cars. This framework is of 3-in. x 1-in. wood and is about 3 ft. long by 2 ft. wide. Two strap iron hinges are fitted to either side of the portions which hold the printing frame. The other end of these hinges is attached to the supporting base. The frame can thus be raised and pushed back out of the way while the sheet iron sign is being reversed or a new one placed in position.

Two small handles on either end assist in the operation. The frame which holds the silk stencil is fastened to the movable part of this framework by two hand screws, so that where it is necessary to change frames, this can be accomplished very rapidly. The entire operating mechanism is arranged so that it can be placed on a table or bench for support, which will bring it to a convenient height for rapid operation. The supporting base has a sheet iron stop at the rear end, which prevents the frame from being pushed back too far when in the raised position.

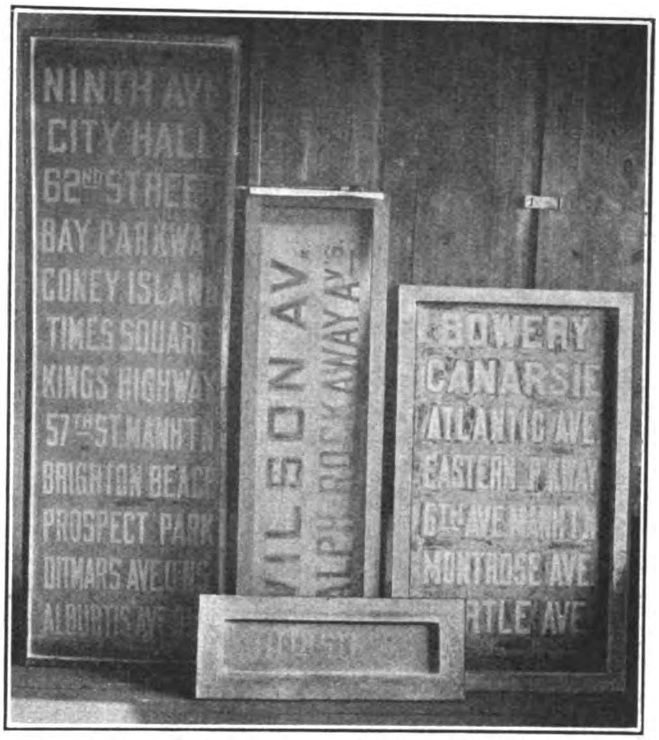
The supports for the signs to be lettered, of course, will vary with different types. For the sheet iron signs just referred to, a wooden framework is made, so that the signs are supported at the edges. This is essential as both sides of these signs are lettered, and after one side has been lettered it is placed with the lettered side down, so of course it is essential that this does not rest on anything that would smear the lettering.

HOW SIGNS ARE MAINTAINED

As this type of sign is used in large quantities, it is necessary to reletter at intervals. The facilities for handling this maintenance work and carrying it on rapidly are particularly interesting. When the sheet iron signs are received for relettering the first operation is to clean and remove the old paint. This is done by placing them in a potash solution over night. The potash tank is installed at one end of the room and the signs are hung on rods by wire hooks. These rods have small grooves so as to keep the signs spaced the required distance apart. Fourteen signs are thus handled at one operation. A large quantity are placed in the tank, and after the paint is loosened it is washed off in a washing tank, which is adjacent to the potash tank. A small overhead traveler is arranged with pulley, so that the rods with the signs attached can be lifted out of one tank and placed in the next. After washing, they are raised just above the washing tank to a wooden framework, on which they are allowed to remain while drying. Just at the end of the washing tank is a dipping tank, which contains the flat body color. When the signs are dry, they are dipped in this tank and then placed on the drying rack. This rack is made of angle iron and the round cross-rods which support the signs extend from one side to the other, while the signs hang down in between. Signs are taken from the drying rack after dipping and are placed in the frame for lettering by the silk screen process. After they are lettered they are dipped in varnish, and after drying are ready to be sent out.

The use of the silk screen process for this class of work has resulted in marked economy on this system. The lettering is now done on a piecework basis and the labor rate is 2½ cents per sign. Previous to the installation of this system, the lettering of ten signs was considered a day's work for one man, and the average cost per sign was in the neighborhood of 65 cents.

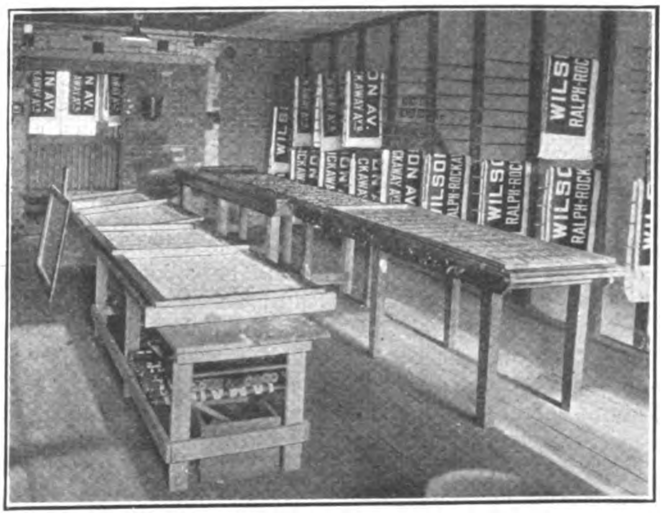
Several other arrangements are used by different railways for holding and operating the frames with the silk stencils. Another type used has hinges placed at one end of the frame, and the frames are raised by having a pulley attachment to the wall over which a small rope operates with one end attached to the frame while the other has a small weight. The weight raises the stencil frame after the sign has been lettered and while it is being removed for the insertion of another one.



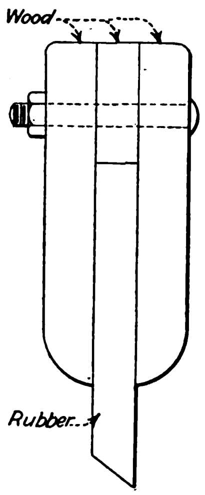
Several Sizes and Types of Silk Screen Stencils

In some cases the frames are made larger than is necessary for the signs to be lettered, and various sizes of signs are used with the same frame by tacking ½-in. strips on top of the bench to serve as guides holding the signs in position. Some sort of accurate support is quite essential in order to make the stencil register accurately with the sign to be lettered.

The paint used for lettering is forced through the silk screen by means of a squeegee, and an accompanying illustration shows the construction of such a squee-



Lettering a Long Routing and Destination Sign by the Silk Screen Process gee which has proved satisfactory. This consists of a sheet of rubber about $\frac{5}{16}$ in. thick clamped between two blocks, with a spacing block at the top. A medium grade of hard rubber is best. This should be cut into a strip about $4\frac{1}{2}$ in. wide, and for single signs it should be a little longer than the width of the design to be lettered. For signs having a large amount of lettering, a squeegee about 12 in. long will be found to be of convenient length and about as long as can be handled readily. In placing the rubber between the boards, it should be allowed to extend about 2 in. outside. The side pieces can best be held in place by two bolts. This method of construction permits of removing the rubber when worn down or for trimming off or sharpening. The edges of the rubber should be beveled and the extended edge made sharp, as it is this edge that is drawn over the side of the frame so as to force the paint through the screen. Careful cutting is quite essential in order to provide an efficient squeegee.



Squeegee Used with Silk Screen Method of Lettering

For white letters, white lead mixed with turpentine and oil is generally used. A small quantity of this is placed along the edge of the frame farthest from the operator. By drawing the squeegee across the screen the paint is forced through onto the sign and so letters it. After drawing the squeegee across the frame in one direction, it is usually found most convenient to draw it in the opposite direction for the next operation, as this makes it unnecessary to scoop up the paint from one end and place it on the other end.

After finishing a job the stencil should be well cleaned. All surplus paint can be removed by a stiff card, and by pouring a small quantity of kerosene or gasoline into the stencil the paint in the screen can be removed by rubbing with a soft cloth. The operation should be repeated until the cleaning is satisfactory, when both sides should be dried carefully. Some roads find that a mixture of equal parts of kerosene and gasoline makes a good cleaning preparation.

USING LARGE FRAMES FOR CURTAIN SIGNS

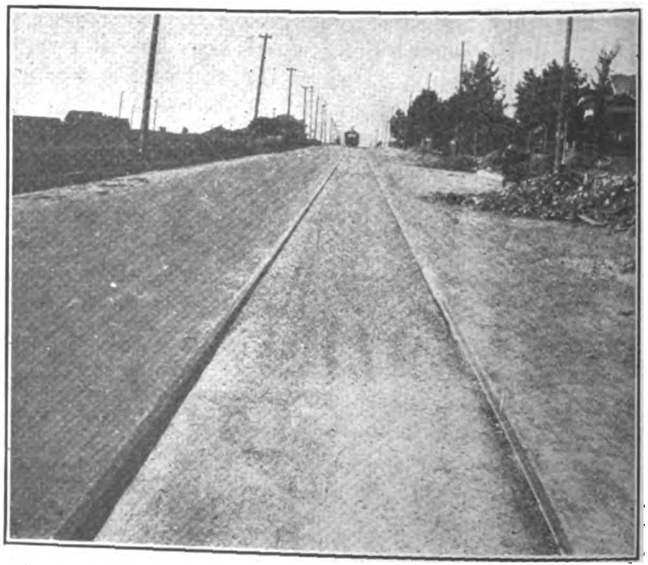
The New York Rapid Transit Corporation uses the silk screen process for lettering its routing and destination signs, which have thirty-one readings on a single sheet. These sheets are lettered on both sides, using 3-in. letters with a 3-in. space on one side and 4-in. letters with a corresponding space on the opposite side. For lettering one of these complete signs, three frames with silk stencils are used. These frames are 26 in. wide by approximately 6 ft. long. Black linen is used as the material for these signs and the lettering is of white lead. The linen is laid on a long table and the lettering is done by beginning at one end and preceeding progressively. One frame is placed in position at a time and the edges of the table are marked so as to insure that the frames register properly with the sign. After the signs are lettered, they are dried by placing on drying racks, which consist of pipe extensions from the wall, so arranged that the signs can be supported on these to insure no interference while drying.

The silk screen process has proved to be very successful for special designs and illustrations, such as are used in publicity campaigns. The particular advantage in using this rather than an engraving or lithographing process lies in the low cost where small quantities are needed. For doing work of this nature it is necessary to prepare a sensitized screen. The original design or lettered copy is traced in black on a transparent surface, such as glass, celluloid, tracing cloth or tracing paper. The cloth is stretched over its supporting frame and after being cleansed the sensitized solution is poured on at one side, so as to cover the mesh entirely. By having the screen at an angle, the solution gradually flows over the surface. This photographic negative is placed with the printing side down on the screen and a heavy piece of glass is placed over this. Then by holding the screen in close contact with the negative, it can be printed the same as in regular photography, by exposing to the sunlight for about twenty minutes. The screen is then washed out by flowing water over both sides. The portion that is protected from the sun's rays will wash out completely, leaving the sun-fixed portions which are insoluble. The printing is then carried on in the same manner as already described.

Where multi-colored reproductions are desired, a separate screen for each color will be needed. The different frames should be prepared of exactly the same size, so as to insure perfect register, and the tracings are prepared by sketching in each color separately on the different screens.

Concrete Cuts Paving Costs*

THE use of concrete for paving between the rails, regardless of the type of pavement used on the rest of the street, has saved the Northern Texas Traction Company, Fort Worth, 50 per cent of the first cost of the work and has at the same time reduced the amount of upkeep required. The franchise of this company states that the railway shall pave between its tracks with the same kind of pavement as is used elsewhere on the street. In the past this practice has resulted in a large amount of unsatisfactory paving being placed between the rails. Moreover, the maintenance of this



This Concrete Paving Between the Rails in Fort Worth Cost Only Half as Much as the Paving Elsewhere on the Street unsatisfactory paving has been very costly. In reconstructing some track recently, preparatory to paving the street, the company sought permission from the city to place concrete paving between the rails, and in spite of objections from the paving contractor permission to do so was granted.

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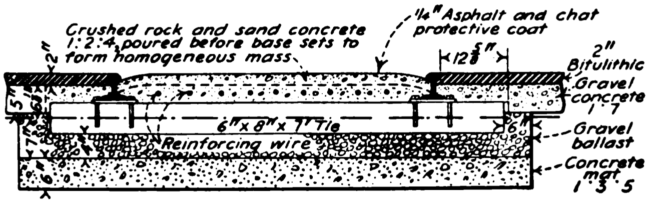
*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

The cost of the paving which the contractor intended to lay would have been about $2 per square yard. Experience has shown that the maintenance cost of this type of paving after it was laid was high. The company therefore told the city officials that it was tired of paying out large sums for the first cost of such paving and later for its upkeep, and promised to lay a better paving of its own between the rails at a cost of only $1 per square yard, with practically no maintenance after the job was finished.


Crushed rock and sand concrete 1:2:4 poured before base sets to form homogeneous mass
¼" Asphalt and chat protective coat
2"
12⅝"
2" Bitulithic
Gravel concrete 1:7
5"
6"
6" x 8" x 7' Tie
Reinforcing wire
6"
7"
Gravel ballast
Concrete mat 1:3:5
6"

Cross-Section of Fort Worth Track Construction with Concrete Pavement. A Wire Net Is Used for Reinforcing

The first step in laying the railway's pavement consisted in bringing up the concrete to within ¼ in. of the top of the rail. About 2 in. below the surface the concrete was reinforced by wire net reinforcing. After the concrete had firmly set the surface was given a coating of tar and chat as a finish. It is predicted by the company that this paving will outlast by several years the bitulithic paving used on the rest of the street.

Track Relaid Amid Heaviest Vehicular Traffic

The Original Rails Laid in 1898 on Broadway, New York City, Were Replaced Under Conditions of Unusual Difficulty

A COMBINATION of circumstances made particularly difficult the job recently done by the Third Avenue Railway, New York, in renewing the rails on Broadway from Forty-fifth Street to Fifty-ninth Street. This area includes the Longacre Square theater district, which is reputed to have the heaviest vehicular traffic in the world. In spite of this fact the work had to be done during the daytime because there are a large number of hotels in this vicinity and they would not tolerate the noise of track reconstruction work at night. A headway shorter than two minutes is operated on Broadway and it was necessary to remove each rail and replace it by a new rail in the interval between cars. With the underground conduit type of construction in use there it was not feasible to switch cars onto another track while this work was in progress.

Another difficulty arose from the nature of the original construction work. The old rail was that laid in 1898, when the first electric car line on upper Broadway was electrified. The foundation was continuous between the yokes and was built with an extremely rich concrete mixture. Considerable difficulty in making even minor repairs had been caused by the solid nature of this foundation. This was one of the factors, however, which made it possible to postpone renewal work and to continue the use of the old rail until a short time ago.

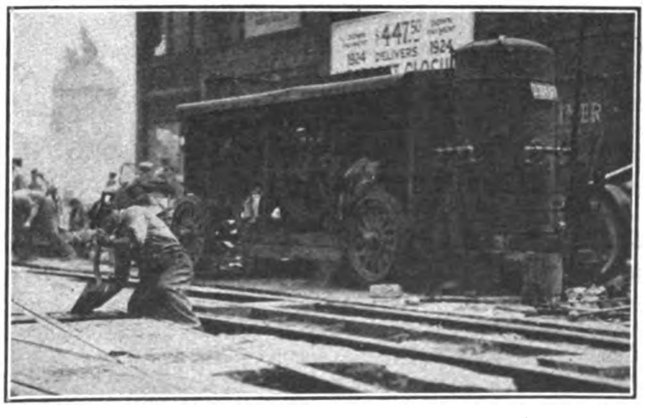
The work done on the present job consisted of removal and replacement of the paving, excavation of a sufficient depth of the old concrete to permit removal of the old rails and the longitudinal timber stringers on which they are supported, in case it was necessary, and the renewal of the track rails.

Knowing the difficulty of the job it was undertaking and the necessity of getting through as speedily as possible the railway assembled an unusual amount of apparatus. A specially mounted new air compressor, built by the Chicago Pneumatic Tool Company and having a capacity of 350 cu.ft. per minute, was used for the first time. In addition to this there was also an older compressor, having a capacity of 150 cu.ft. This made possible the simultaneous operation of nine compressed air drills, six on the large machine and three on the small one.

The southbound track was relaid first and then the northbound. Only two blocks were open at one time. While the excavation of one block was in progress, new 9-in. grooved girder rail was being put down in the block behind. This in itself was no small task with the short headway on the route, but service was not interrupted for longer than a few minutes on account of the track reconstruction. As soon as the new rail was laid the excavation was concreted ready for the asphalt pavement, or else temporarily filled in so that traffic could pass.

In many cases the digging had to go down to depth of 16 in. or more. This was necessary in order to cut free from the concrete the timber supports which run lengthwise under the rails. It was found that where "dutchmen" had been put in at the joints the supporting timbers usually were cut up. The amount of timber replacement averaged about 3 ft. for each 60 ft. of rail put in. The slot rail was not renewed.

This was the first job on which the 350-cu.ft. capacity air compressor was used and it proved to expedite the construction greatly. The new machine proved to be very reliable and operated continuously for many hours each day without a single shutdown. Under ordinary circumstances a machine of this capacity would hardly be needed, but where an asphalt pavement had to be taken up and a solid concrete foundation excavated the greatest possible number of pneumatic drills was necessary. By the use of the new machine, together with the older one already mentioned, and a large gang of experienced track men, it was possible to complete the job of 3,500 ft. of double track in seven weeks.



A 350-Cu.Ft. Compressor Was Employed to Expedite Track Reconstruction Work on Upper Broadway, New York

The Readers' Forum

Insurance Men Want to Help Reduce Premiums

WESTERN ACTUARIAL BUREAU

CHICAGO, ILL., Dec. 7, 1923.

To the Editors:

Your editorial on fire prevention in the issue of Dec. 1 was more than of passing interest, in that you have hit upon the key to lower insurance costs to street railway companies.

You may remember from the articles which appeared in your paper, some time since, covering the East St. Louis & Suburban Railway and the Tennessee Electric Power Company, that quite a material saving in fire insurance premiums may be enjoyed through proper attention to even ordinary fire protective precautions.

That the fire insurance companies are willing to co-operate in this work is evidenced by the fact that in many insurance jurisdictions special men or separate departments are maintained to handle just the electrical properties.

Keep up the good work. We are with you in any effort put forth to help in the fire prevention work on street railway properties. JAMES S. MAHAN.

Further Suggestion on Reducing Number of Car Parts

DEPARTMENT OF COMMERCE
OFFICE OF THE SECRETARY

WASHINGTON, D. C., Dec. 5, 1923.

To the Editors:

Your idea of approaching the storekeepers in promoting simplification of car parts is a splendid one. They ought to know what excessive diversity means in increased inventory, increased investment, increased carrying charges, greater depreciation and obsolescence, as well as extra space required, and the ever-present difficulty of always having on hand plenty of what they don't want and never enough of what they do want.

One major advantage of simplified practice is that it can be applied by purchaser as well as by manufacturer. Why should an electric railway company carry in its stores ten, or even five, different varieties of the same thing if their requirement can be amply covered with one or two? The steam roads have been doing some effective simplification of stocks recently, and in the past two and a half years forty of the large roads have reduced their total stores investment from $480,000,000 to $300,000,000, or 37½ per cent. At the same time, they have cut their stocks on hand from six months' to three months' supply, and find that they can give good service on that minumum through the better co-ordination of purchasing and delivery schedules.

In the automotive field we know of a certain large garage company which, by simplifying its equipment to one make of motor trucks and one make of passenger cars, reduced spare parts stock from 20,000 to 5,000 items, reduced varieties of tires, oils, greases, etc., decreased stockroom space, personnel and investment; also secured better prices in purchasing, and reduced costs (not including pay of drivers) 2 cents per mile in 1922 over 1921 and 5 cents per mile in 1922 over 1920.

Isn't there something in these examples for the electric railway companies? If, coincident with their efforts to induce more people to ride, they applied simplified practice, i.e., the elimination of superfluous varieties, to their purchases, etc., wouldn't the combination prove a paying one?

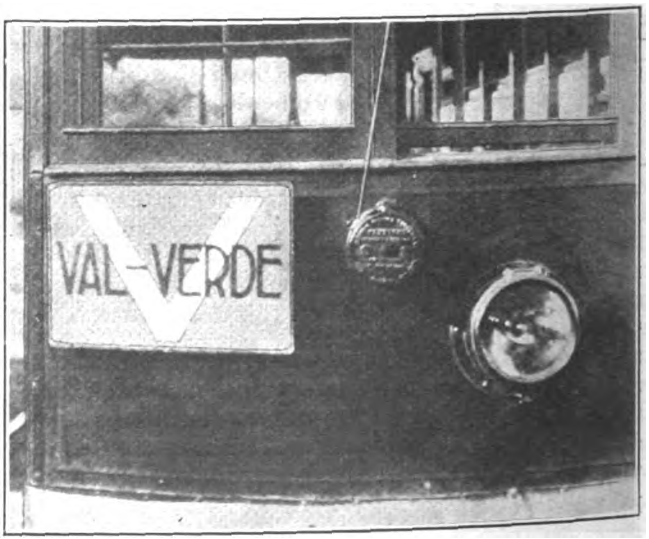
Simplified practice means the reduction of variety in sizes, dimensions and immaterial differences of everyday commodities as a means of eliminating waste, decreasing costs, increasing profits and values in production, distribution and consumption. It is not standardization! Instead, it is often the forerunner of standardization, for by eliminating unnecessary varieties the way is cleared for that concentration on the varieties remaining which permits the development of standards that are real standards. Simplified practice is a measure which can be applied with immediate benefit and with accruing advantage during the usual long evolutionary period required in producing a standard.

The survey you propose to make will, we believe, bear out these statements. We will be eager to hear your findings and conclusions. If we can be of further help to you, let us know. Meantime, the best of success to you. You have started a well worth while movement, and we are very confident many of the companies will warmly respond to your suggestion as to how they may apply simplified practice to advantage in their big problem of lowering operating ratios.

DIVISION OF SIMPLIFIED PRACTICE,
BY R. M. HUDSON.

[For previous discussion of this subject see ELECTRIC RAILWAY JOURNAL for Oct. 27, page 744, and Nov. 17, page 845.—EDS.]

Large Letters on Dash Sign Distinguish Routes*



CARS which operate on different lines of the El Paso Electric Railway and running in part over the same streets are equipped with special car destination signs, 16x24 in. on the dash, in addition to the regular illuminated sign carried on the hood. These signs are differently colored for the different lines, and the line is designated by a large letter such as P for Park and V for Val Verde, as shown in the illustration.

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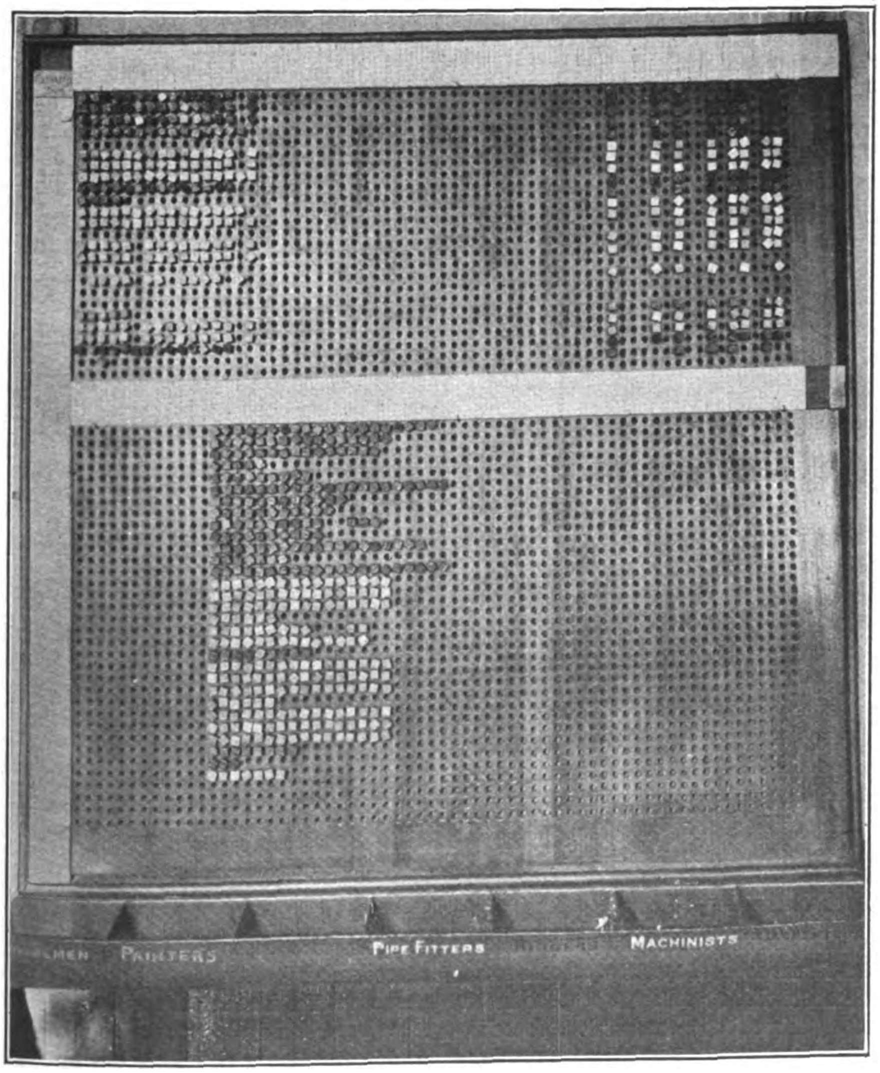
*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

Equipment Maintenance Notes

Board Shows Progress of Car Overhauling

THE accompanying illustration shows a progress board which is installed in the office of the superintendent of rapid transit shops of the New York Rapid Transit Corporation at Thirty-ninth Street, Brooklyn. This is arranged to show the progress made in overhauling cars by the different departments through the use of pegs which are placed in holes on the board. The board is about 4 ft. x 4 ft. in dimensions and has the various holes arranged in rows and columns. Car numbers are placed at the top of the board and opposite each row at the side is a designation of the type of work to be done, such as stripped, gates removed, seats inspected, hand straps inspected, floor repaired, doors inspected, foundation brake rigging overhauled, shields over resistance repaired, etc.

The board is divided into two parts the upper section being used for elevated cars and the lower section for subway cars. Each class of work is designated by a different colored peg—blue is used for wiremen, yellow for painters, green for the truck department, white for pipe fitters, red for riggers, light blue for machinists and black for the carpenters. Seven pockets are provided at the bottom of the board for holding the pegs. When a car is received in the overhauling shop the clerk places the car number at the top of the board, and as soon as the particular class of work is finished the foreman puts a peg in the proper location to indicate that the work is completed. The progress of the work can thus be seen at a glance not only by the superintendent of rapid transit shops and his assistants but by each individual foreman. They can thus see what class of work is behind and bring proper pressure on those responsible so that the work will be turned out promptly. The working of the board is entirely automatic, as each foreman places the pegs in position, and at the same time looks over the record of work so as to see which cars are ready for his men. The board has also proved an incentive to each foreman to keep a record of the work in a small notebook. Previous to the use of this the general superintendent had particular difficulty in having each individual foreman keep a record of the dates that work was done on various cars, but with the use of this board the foremen place a record in their notebooks so that they can peg up their work each morning, in order to show its progress. When the work on a car is completed and leaves the shop the clerk removes the pegs from the column under the car number and removes the car number.

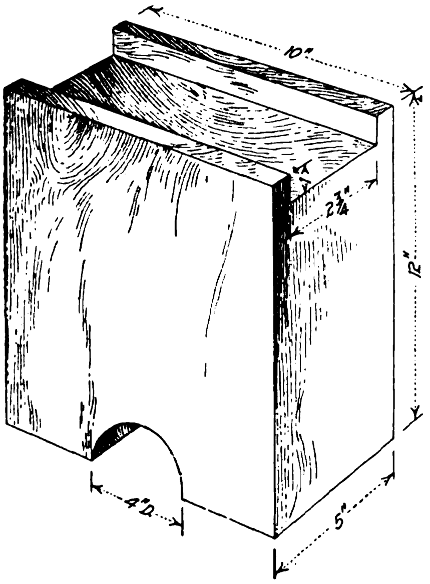


A Distinctive Colored Peg Designates Each Class of Work in Overhauling Cars

Wooden Journal Box for Skidding Truck

AFTER a truck has been dismantled it is often necessary to move the frame about the shop for repairs. This of course can be accomplished by means of an overhead crane. However, "skidding" a truck around on pairs of wheels is an easy method. As this requires the replacing of the four journal boxes and brasses it is looked upon as rather an arduous task. A device worked up in the shops of the Metropolitan West Side Elevated Railway, Chicago, facilitates this work by eliminating the placing of the journal boxes and brasses.

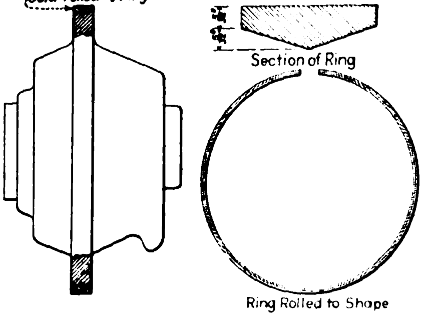
A pine wood block, cut to fit the pedestal jaws, of such height that the center of the axle will be in its normal position, is used. The truck is lifted, a pair of wheels rolled under and these wood blocks inserted in place of the journal boxes. With grease on the bearing end of the box, a truck may be skidded about with ease. As a safeguard against the block sliding out of position, a groove is cut in the upper end 3¾ in. wide and 1 in. deep to receive the truck frame member. The block itself measures 12 in. long, 10 in. wide and 5 in. thick, and besides having the groove to receive the truck frame at the one end, it has a semi-cylindrical groove at the other end to receive the axle bearing.



Wood Block Used in Place of Journal Box, for Mounting Truck on Axle, to Skid Truck About Shop

Building Up Worn Armature Housings

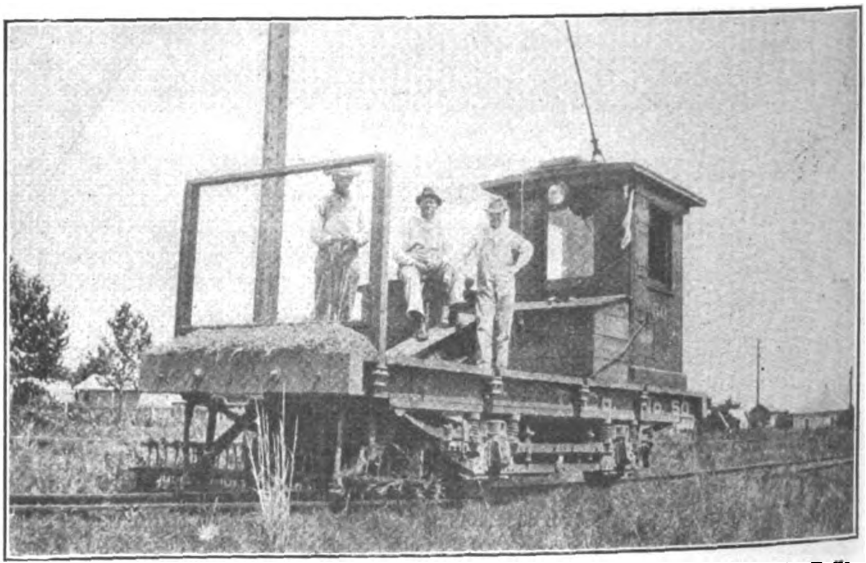
CONSIDERABLE wear occurs between the bearing surface of armature housings and the frames of split-frame motors. A method of renewing the wearing surface of housings is used at the West Shops of the Chicago Surface Lines which is very simple and can be carried out without much cost. An accompanying illustration shows the method. The worn head is turned up with a V-shaped groove and a ring of cold rolled bar stock is fitted into this. The section of the groove and the shape of the ring used are shown in the accompanying drawing. The ring is formed of ordinary steel plate with an opening so that it can be sprung into place on the armature housing, and, of course, it is held firmly in place by the two halves of the motor shells when these are fastened together. By this arrangement repairs are carried out at small expense. Drilling for screws is unnecessary and the adding of metal by welding also is not required. When the ring becomes worn it can be removed and readily replaced.



Method of Building Up Worn Armature Housing and Section of Cold Rolled Steel Ring Used

Weed Whipper Reduces Danger of Accidents*

ONE of the problems of the track department of the Northern Texas Traction Company, Fort Worth, is to keep the grass cut below the level of the rails on interurban lines. This is particularly important because grass on the rails makes it difficult to stop cars in an emergency. To accomplish this without a great deal of waste of time and labor, the company has built a single-truck service car with an end cab, equipped with a stationary motor on the deck. This motor drives a shaft suspended just above the rails and in front of the truck. The shaft, which is of 3-in. diameter, is bored with one-half inch staggered holes 2 in. apart, through which 24-in. sections of steel cable are thrust. The latter are held in place by seven screws. With this equipment it is possible to cut an average of twelve miles of grassy track per day. Its use has made it possible to keep a neat appearing right-of-way and at the same time to reduce the accident hazards by keeping the grass off the rails.



Steel Cable Sections Fastened to a Rotating Shaft Cut Weeds from Between the Rails

Keeping Waste Under Journals

A COMMON type of journal box cover is held in place by a single bolt at the top, about which it rotates, while a spring between the top of the cover and the bolt gives the required tension to hold the cover in position. Trouble is frequently experienced by the waste in the journal box working forward and forcing the cover out of position. This allows the waste to hang outside the lower part of the journal box and oil is thus fed out of the box leaving the rear end empty. This results in hot bearings.

The accompanying illustration shows a bent sheet-iron plate attachment to fit inside the journal box cover and hold the waste in position under the journal. This design was originated by H. C. Mason, lubricating engineer for the Texas Oil Company. A shelf or lip is provided on the bent plate attachment which projects inward toward the axle. When in place the working of the waste forward under this shelf holds the cover more firmly in position, and with the journal properly packed this shelf will press on the waste and hold it under the journal, and the waste cannot get out or change its position. It is also impossible for the cover to change its position to any extent, as the attachment comes in contact with the housing and prevents it.

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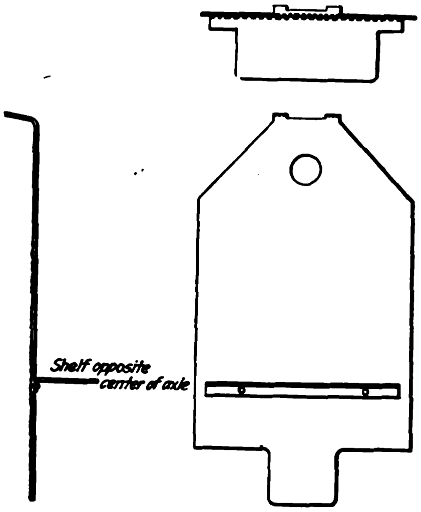
*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

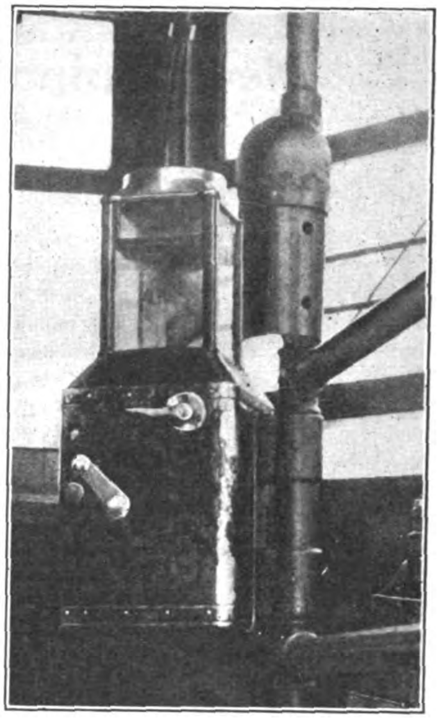
In the usual maintenance of waste in bearings it is quite common practice to force the waste in place up against the journal, at frequent intervals by a packing iron as the waste works forward. Every time that the oiler uses the packing iron it cuts some of the threads of the waste, which decreases its value as a medium for conveying oil to the surface of the journal to be lubricated. Also, if proper care is not exercised the waste may be pressed so hard that the oil will run out the back end and on to the wheel, so as to cause the housing to overflow. By using this attachment it is unnecessary to press back waste at such frequent intervals, so that there is a considerable saving in labor and a reduction in the amount of oil wasted. The device is a good insurance against hot journals.



Bent Plate Attachment to Journal Box Cover for Retaining Waste in Place Under Journal

Lighting the Fare Box on One-Man Cars*

SINCE the development of the one-man car, the necessity of some better kind of illumination near the fare box for the convenience of the operator, so that he could more readily punch transfers and make change, has been realized by railways. Also, with the ordinary lighting, it is sometimes difficult to see whether or not the proper fare has been deposited in the box. The El Paso Electric Railway has equipped one car with a lighting unit as shown in the accompanying illustration. A condulet of the VD-33 type was installed on the fare box stanchion, making a shade to cover the light globe and cutting an inverted V on the edge of the shade so that the light would reflect into the fare box. The operators were so well pleased that this device is now being used on all of the company's one-man cars.



Adequate Light Is Directed to the Fare Box by Means of This Unit

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A Ray of Light Strikes the G. M.

William Redfield, general manager of the Jinxville Railway, gets a tip from a lawyer friend from the South. Decides a few things can be done to brighten up his machine shop with a view to the comfort and safety of the men and improvement in the work.

◆

AN air of gloom pervaded the machine shop of the Jinxville Railway on this December morning. There was no sensing of the Christmas cheeriness on this day. The rain was beating down outside and Ole Olsen, Dick Singer and the rest were trying to do their work with the aid of a few dingy carbon-filament incandescent lamps, which hung by long cords from the ceiling. It was enough to give anybody the blues. Even Singer, usually referred to as "Whistlin' Dick," was glum.

Into this depressing atmosphere William Redfield, the general manager, brought a visitor, a lawyer from West Virginia.

"Hello, what's this dark hole?" asked the visitor, as they stepped in.

"Machine shop, Sam," replied Redfield; "it is a bit forbidding, but it's a dark, wet December day outside; you can't expect much brilliance on a day like this."

"I suppose not, William; not being a railroad man I don't feel like criticising. I'm a lawyer, though, and handle a lot of accident cases. I'll bet it would cost you a pile of money if one of your men got hurt from not being able to see clearly.

"Our men don't complain, Sam; but now that you've called my attention to it the place does look mighty dark."

"I'll say it does, Bill. I don't see how you expect to turn out good repair work in a shop like this. Seeing your shop reminds me, by contrast, of one down where I live, in Huntington. Say, old man, that's one of the most cheerful places you can imagine. Our little railway is a crackerjack, anyway; but the shop is one of the best parts of the outfit. You ought to have a look at it. The walls are all coated—some kind of a shiny paint—and the windows are big enough to let in some light. Then for dark days they've got some worth-while lamps. Of course, you'll say I'm always boostin' Huntington. Well, it's worth it. If I didn't know you so well and what you've done in a little over a year to rejuvenate this run-down property I wouldn't say anything. I know you won't take this amiss. No charge for the advice either. I usually collect about $25 for a suggestion like that."

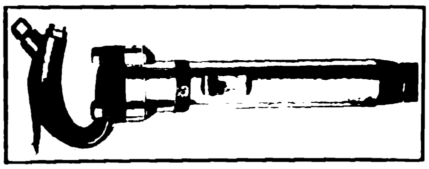
"No harm done, Sam, and maybe some good. You've opened my eyes a bit. I see several things we could do here for a little money. We could get some good paint on the walls; we could hang some decent fixtures and lamps; we could put in two or three skylights, and we could clean our windows. Bill Jones, our foreman here, is a good fellow but kind of slack. I'll put him wise to this matter and I think the men will appreciate it. Let's go over to the paint shop. It's more cheerful over there."

New Equipment Available

New Type Riveting Hammer

THE Ingersoll-Rand Company, New York, N. Y., has developed a new type of pneumatic riveting hammer with many added improvements. The outstanding features of this new riveter include bolted construction for holding the handle to the barrel, heavy section valve with liberal bearing surfaces, combination poppet and piston type throttle valve, power in excess of ordinary requirements, low air consumption and easy operation.

The new hammers are manufactured in three styles, A, B and C, and are available in a complete range of sizes from a 5-in. to a 9-in. stroke. Each size of this riveter can be purchased with any one of three types of barrels and with either outside or inside trigger handles.


Rivet Hammer with Features for Easy Handling

The standard "A" type has a barrel machined to accommodate a rivet set clip only; three alloy steel bolts, fitted with lock washers, hold the handle to the barrel. This enables the hammer to be taken apart anywhere for inspection or cleaning with the aid of only a wrench; no vise, crowbar or other tools are necessary.

The throttle valve, except on inside trigger handles, is a combination of the piston and poppet types, having the control of the piston valve and the freedom from leakage of the poppet type. The beveled seat will remain tight and prevent leakage. The throttle lever or trigger is made in one piece from special heat-treated spring steel and has a long bearing in the handle, making it capable of withstanding abuse. The control is sensitive, ranging from a light tap to a heavy blow, entirely at the will of the operator.

The valve is a sleeve made from special alloy steel. It has liberal bearing surfaces and its walls are free from holes or ports which so often are the starting points for checks or cracks. It operates in a valve box of strong construction, located in the head of the barrel. The valve box is constructed with a solid end which enables it to be easily taken apart by the use of a piston for the removal of the valve, without recourse to the use of a screwdriver or similar instrument. This construction also insures a compression chamber in the valve box which cushions the piston on the return stroke and prevents the piston from striking the handle.

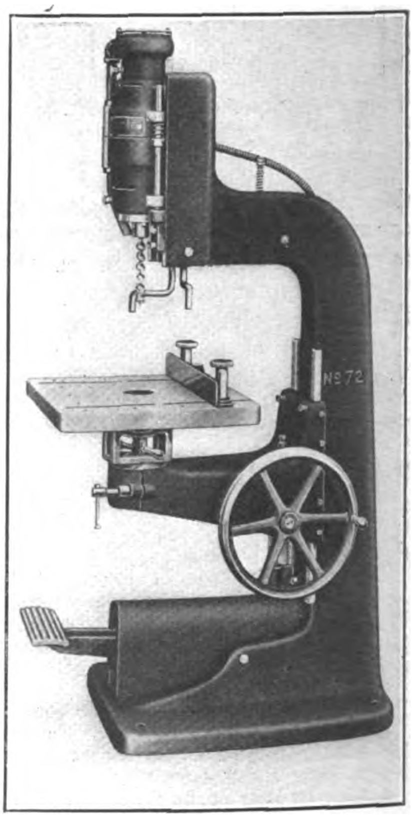
The handles are of high quality steel, drop-forged to a shape that fits the hand and are sand blast finished to give an excellent grip. Either outside or inside trigger handles can be furnished, although the outside type is standard. The exhaust is through the side of the barrel near the handle and can be deflected in any direction desired by the operator, by merely turning the deflector.

Due primarily to the bolted handle construction, the hammers are lighter in the handle end and are better balanced and easier holding, especially when used in a horizontal or inverted position.

Boring Machine with Motor Armature on Spindle

A SINGLE-SPINDLE borer with several new features is being placed on the market by the Oliver Machinery Company, Grand Rapids, Mich. This machine has been given the name of "Motor-in-Head Vertical Borer" because the rotor of the motor is mounted directly on the spindle of the boring machine. This eliminates all belting, countershafts, pulleys and a number of bearings. It also saves floor space and makes a simpler machine. Another interesting feature of this machine is the blower, which is also mounted directly on the spindle at the top of the machine. This blows the dust or borings away from the work.

This machine has a capacity for boring holes up to 2 in. diameter and up to 6 in. depth with one stroke. The distance from the center of the spindle to the column is 18 in. and the vertical movement of the table 14 in. The maximum stroke of the motor head is 6½ in. The table swivels completely around and tilts up to an angle of 45 deg. in any direction. The column is a one piece casting, with a wide flange base, measuring 24 in. by 31 in. A counterbalancing weight is provided inside the main vertical portion of the column, which also forms the connecting link between the foot lever and the head lever. A hood cast integral with the column deflects chips away from the foot lever. The motor is fully inclosed and the housing consists of two halves clamped together by large bolts. The motor's stator is clamped concentrically inside of these two halves with an air passage for ventilation. The rotor, together with the spindle, is provided with ball bearings at the outer ends. The lower half of the motor head has a lug at the back through which a connecting link and a counterbalance lever system reaching to the foot lever supplies the downward motion of the head. A coil compression spring provides the necessary return movement.



Single-Spindle Boring Machine

A funnel type pressure blast fan is mounted at the upper end of the motor head. The blades are one-piece aluminum castings pinned to the upper end of the boring spindle. The air blast is directed downward toward the boring point, so as to blow the chips away and cool the boring bits.

Association News & Discussions

Way Problems Occupy New England Club

Progress in Methods of Snow Removal, Systematized Methods of Track Repair and Electric Freight Opportunities Discussed at Boston Meeting—Machinery Playing Larger Part in Way Maintenance

THE advance of machine methods into the field of way maintenance featured a well-attended meeting of the New England Street Railway Club at the Copley Plaza Hotel, Boston, Dec. 6, President Ralph D. Hood occupying the chair. A number of addresses were given on the subjects of snow removal, trackwork and interurban freight. Following the usual dinner, Chief Photographer Jones of the Boston & Maine Railroad gave an illustrated lecture on the "Scenic Attractions of Maine."

In an early issue an extended account of the Eastern Massachusetts Street Railway Company's planning and control of way maintenance will be published by courtesy of R. B. Stearns, vice-president, and F. B. Walker, enlarging upon the material presented at this meeting in a paper by Mr. Walker on the subject "Track Machinery."

SNOW REMOVAL BY MACHINE METHODS

C. F. Reuter, engineer Eastern Tractor Company, Cambridge, Mass., pointed out in his talk on "Snow Removal" that the demand for snow removal has attained such proportions that this year an effort will be made by the Massachusetts Department of Public Works to keep open a number of the major trunk line highways, although not as much work will be done as though the proposed tax on gasoline had passed the last Legislature. Monopolization of street railway tracks by highway traffic is to be done away with on these trunk lines. It is proposed to try out the use of buses equipped with a form of plowing apparatus on some branch highways, but this, in the speaker's opinion, will be chiefly experimental.

The tractor, with its concentrated large power, appears to offer the best solution of the snow-removal problem, declared the speaker. It has been successful in Dakota, Montana, Michigan, New York, New Hampshire and other states. Despite the high power present in the modern tractor, a representative unit described by Mr. Reuter has a bearing weight of only 4 lb. per square inch upon the highway and does no damage to the road. Drifts 8 to 10 ft. deep can be handled with ease. A plow with a 10-ft. blade run by a 5-ton truck will remove 40,000 sq.ft. per hour as compared with 70,000 sq.ft. by tractor. The tractor costs less to operate than the truck and the average expense of "bucking" snow with a tractor of from 5 to 10 tons rating is about 92.4 cents per mile of route cleared.

The latest development in snow-handling equipment, the speaker stated, is the rotary plow-tractor combination. A 5-ton tractor unit is equipped with a 60-hp. gasoline engine, driving a rotor plow at 1,000 r.p.m. Two inverted V-blades lead to an opening with an area of 4¼ sq.ft. at the throat of the plow, the scooped in snow being drawn through the rotary blades and thrown to one side for disposal. The machine adjustments permit throwing the snow 100 ft. off-side, or the outfit can be designed to deposit the snow in a gondola car behind the tractor. If desired, the snow can be thrown off at intermediate distances. Loading into another vehicle continues while the plow and tractor are moving with traffic at a speed of from 1 to 6 m.p.h. The snow is pulverized finely so that a 5-ton truck will carry away about 4 tons of dry snow instead of 1 tons of loose, lumpy snow.

A new plow to be used by the Boston Elevated Railway will carry rotor blades of 2-in. x 18-in. x 36-in. chrome-nickel steel. The rotary end costs about $6,000. A 5-ton Holt tractor with auxiliary equipment costs about $4,750, or a Best tractor, including cab, heating coil, radiator and complete lighting outfit, $4,250.

In clearing the Champs de Mars, Montreal, Canada, of snow the job was done by tractor for $25, whereas an appropriation of several thousand dollars had been thought necessary for hand shoveling. This field was 1,000 ft. long, 125 ft. wide and had snow on it 18 in. thick. The rotor runs in ball bearings and will turn four minutes after receiving an impulse by hand. The latest rotor has four blades, which means 4,000 cuttings per minute. The cutter can be dropped from 8 in. above the rail to the rail top. The intake blades are lined with ⅝-in. metal reinforcement and can be reversed after wear. The minimum width of the machine is about 6 ft. 9 in. to 7 ft. The overhang over curves covers about 5 ft. of street width. Estimated yearly depreciation of the tractor is 12½ per cent, and repairs 6¼ per cent, of the first cost. The engine is the only part which is likely to give trouble.

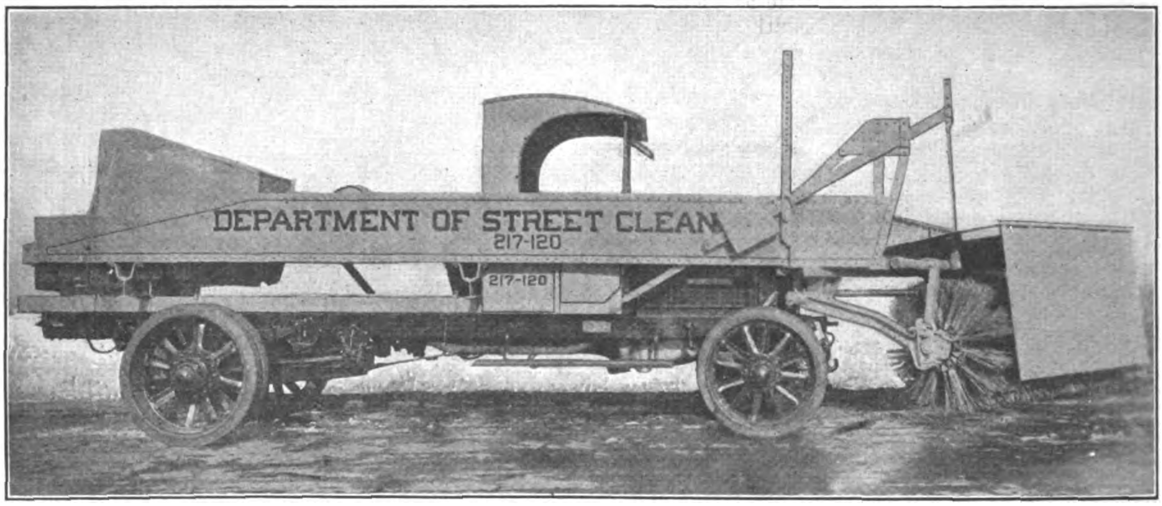
EXPERIENCE WITH ROTARY SNOW BROOMS IN GREATER NEW YORK

W. B. Kelley, head of the division of operation and maintenance, Department of Plant and Structures, city of New York, described the failures of old-style sweepers and plows on Staten Island, N. Y., during heavy storms three years ago. Grades on this system run from 6.5 to 10 per cent maximum, curvature reaches 28 to 33 deg. and there are many hills and valleys, with great exposure. In 1921 the trackless trolley system was installed and in the fall of that year a Fox rotary snow broom was tried out by the city. Twenty-six snowstorms with a minimum of 6½ in. of snow were overcome without tying up traffic, and in one case 56 miles of track were cleared in 3¼ hours, when all other sweepers had failed. "I tried every known mechanical stunt to make the outfit fail," said Mr. Kelley, "but the machine merely laughed at me and came up for more punishment!" The Staten Island lines were operated when all other surface lines in New York were tied up. The Fox outfit is run in summer as an emergency truck and tower. The broom will remove more snow from a paved street than any two sweepers. A nine-track terminal with two automobile thoroughfares was cleared in 43 minutes compared with hours' work by 200 to 300 men in older days.

Mr. Kelley said that the broom can be removed in 25 minutes. Rattan is used instead of steel for the brushes. Only three sets of brooms had to be purchased in the twenty-six storms. The railway has gone through 7 ft. of snow with this broom and the Public Service Commission of New York highly praised the road's efforts to keep open during the past winter. The outfit can be mounted on a chassis and removed in about an hour. The New York Street Cleaning Department now has fifty-six of these brooms; the trackless trolley system has two and four more on order. There is a 24-ft. roadway on the trackless trolley system and the trolley runs from side to side like a bus. About 26 miles comprise the trackless trolley system. The broom operates when going up grades, as it has a separate engine drive, and this is not the case with an electric sweeper. Four or five of these outfits went a long way toward keeping the International Railway lines in Buffalo open during severe winter weather. The Department of Plant and Structures of New York proposes to purchase ten more rotary brooms for use on the trackless trolley lines. All the Staten Island sweepers were to be sold last week.

Interurbans Making Progress in Freight Haulage

That remarkable progress has been made in the business of handling freight on interurban lines was the conclusion of T. H. Stoffel, Westinghouse Electric & Manufacturing Company. This has taken place particularly in the Central West and even there only the surface of possibilities has been scratched. Data have been gathered, he said, which indicate that approximately $50,000,000 will be received by electric lines for handling freight and express for the years 1923, and that a total of more than 1,000,000,000 ton-miles will have been handled before the end of the year; that electric lines now have in regular freight service more than 13,000 freight and express cars, and more than 475 electric locomotives are employed.



Rotary Snow Broom of Type Used by Department of Plant and Structures on Staten Island Lines in New York

The fourteen or fifteen electric lines, operating over 4,000 miles of track in the Central States, are not confining their efforts to the handling of merchandise or less than carload freight, but in the past two years have consistently broadened their field and are gradually adding facilities permitting them to move all classes of tonnage, including carload consignments of live stock, cement, stone, building material, coal, lumber, logs, canned goods, etc., at rates which are competitive with those in effect on steam lines.

As a result, these lines are finding it difficult to take care of the demands made upon them, through lack of rolling stock and adequate terminals. Shipments are handled over this group of lines for distances up to 350 miles or more, and the service rendered is from forty-eight hours to eight or ten days better than can be secured through any other means of transportation.

The lines centering in Indianapolis handled more than 8,000 carloads of live stock into the Indianapolis stock yards in 1922, which was three-quarters of the total received at those yards. The indications are that they will do much better during the current year, as stock raising has been taken up by many farmers who formerly thought that the effort was not warranted by results. Another line handled 2,500 carloads of cement up to Nov. 1 this year, and has contracted to move more than 3,500 cars during 1924. These cases are cited merely to indicate the extent to which freight business has been developed in the Central West.

What is probably of the greatest importance is that the lines in the territory referred to are showing a net profit in their freight operation of from 15 to 35 per cent on the investment in freight facilities and equipment. This balance appears after deducting from freight income all expense directly chargeable to freight operation, and in addition an equitable proportion of the cost of maintenance of roadway, track, distribution system, power plant, administration, taxes, etc.

Possibilities of conducting a remunerative freight business in the New England district are as good as if not better than in the Western territory, according to the speaker. New England is primarily an industrial section of the country, and there is hardly a town that does not produce tonnage, and of the class which can readily be handled with interurban equipment. It is realized that some of the lines in the New England district are carrying freight, but it is obvious that full advantage is not being taken of the possibilities.

While the motor truck is becoming an exceedingly important factor in the transportation of the country, it is handling tonnage every day which should be better and more economically moved by electric lines, and at much less cost to the public. Steam carriers are also beginning to realize that their equipment and facilities, which were necessarily designed and constructed for the movement of long hauls and heavy, bulky tonnage are not suitable for the economical handling of the comparatively short-haul tonnage, and this tonnage, particularly less than carload merchandise, is less profitable for them. As a result, some of the large trunk lines are giving serious consideration to ways and means of relieving themselves of the burden of transporting such tonnage of congested terminals for destinations 100 to 150 miles distant, thus relieving both terminals and rolling stock for use in the more remunerative and desirable long-haul traffic. One of the main trunk lines is also experimenting with the motor truck to relieve terminal congestion, while other roads are asking shippers at large terminals to consider shipping via electric lines where available, or to use esablished motor truck lines.

Experience has demonstrated, concluded Mr. Stoffel, that it is not impracticable or unreasonable to superimpose the operation of freight on the passenger service rendered by electric lines. Much of the road work can be done at night, or during off-peak hours when the power demand is low, and therefore no additions are necessary to power generating and distributing equipment. Practically the only added expense attached to the transportation of freight is to provide motive power, rolling stock, terminals and a competent and experienced traffic department, the cost of which is comparatively small. The net returns invariably more than warrant the effort.

A.I.E.E. Midwinter Convention

TWO sessions will be devoted to national transportation problems at the midwinter convention of the American Institute of Electrical Engineers, to be held at Philadelphia Feb. 4 to 8. These will be held at the Metropolitan Opera House the afternoon and evening of Feb. 5. Among the speakers will be Ralph Budd, president Great Northern Railway; N. D. Maher, president Norfolk & Western Railway; C. H. Markham, president Illinois Central Railroad; Edward G. Buckland, vice-president New York, New Haven & Hartford Railroad; and L. G. Coleman, assistant general manager Boston &

Maine Railroad. Other speakers will be announced later.

A wide range of subjects will be discussed at the convention, including such topics as the superpower system and other transmission subjects, power-plant operation, insulation, generator design, radio telephony, and miscellaneous subjects. Monday evening will be devoted to a celebration of the fortieth anniversary of the founding of the Institute.

Proposed Motor Vehicle Statute

At Convention of Utility Commissioners, Committee on Motor Vehicle Transportation Recommends Regulatory Law and Sets Forth Its Advantages

At the annual meeting in Miami, Fla., last week of the National Association of Railway & Utility Commissioners, the committee on motor vehicle transportation suggested a "model motor vehicle statute." It is based somewhat on the present regulation in the State of Washington, and the report was presented by E. V. Kuykendall, chairman of the committee and director of the Departmnt of Public Works, Washington. According to this law all companies and individuals engaged in auto transportation would be divided into two classes, namely, Class A, embracing all supplying auto transportation between fixed termini over a regular route, and class B, those not operating between fixed termini or over a regular route.

Class A companies are required to take out a certificate of convenience and necessity, file quarterly reports with the commission and pay a fee, not to exceed 1 per cent of their gross revenue, to cover the cost of supervision and regulation.

Class B operators are those which in the past have usually escaped regulation, but are now forbidden to operate for the transportation of persons or property for compensation without having obtained a permit from the commission to do so. For such permit they will pay an annual fee of $10 for the vehicle, a fee of 50 cents per passenger seat, provided that the passenger seating capacity exceeds eight, and $2 per ton for weights over 3 tons.

The commission has power to supervise and regulate all such companies, whether in class A or class B, to fix, alter and amend just, fair, resonable and sufficient rates, various charges and classifications, require the filing of reports, describe rules and regulations for their service.

The law declares that an occasional accommodative transportation service by a person not in the transportation business shall not be construed as a service for compensation. Operation within a city or town, school buses and vehicles engaged exclusively in hauling farm products are also excluded.

Reasons for Statute

In explanation and support of this bill the report, said in part:

We realize that there are a number of states in which motor vehicle regulation is administered under general statutes authorizing regulation of the rates, service, and facilities of common carriers, but there are so many peculiar phases of motor vehicle regulation which are inapplicable to other modes of transportation that better results can be obtained through special statutes covering that subject alone.

The first question which would probably suggest itself is: Why divide auto transportation companies into two classes? The original auto transportation acts in several states undertook the regulation of companies operating between fixed termini or over a regular route only. Practical experience has disclosed that freight trucks and for-hire passenger cars, maintaining stands in the various cities and towns, are operating over the routes covered by the certificates of convenience and necessity issued to the auto transportation companies and are keenly competitive therewith. These independent operators do not come within the purview of most of the regulatory acts, for the reason that they do not operate between fixed termini or over regular routes. They escape all regulation. They are not put to the expense of fees nor the furnishing of bonds required of regulated concerns to protect the public against negligent operation. They frequently engage in cutthroat competition with each other and with certificate holders to their own detriment and to the injury of regular certified operators and ultimately to the detriment of public service. All auto transportation companies transporting passengers and/or property for compensation would be embraced either under one of the two classes mentioned in the act.

The proposed act does not go into detail as to the manner of regulating these operators. To do so would be impracticable. The details must be worked out by the regulatory body, based upon practical experience, and under the broad provisions of the proposed law, which require all rules and regulations to be just, fair and reasonable as to said two classes of companies in their relations to each other and to the public.

Certain Carriers Are Excluded

The proposed act excludes from regulation motor-propelled vehicles operated wholly within the incorporated limits of any city or town. This, of course, is a matter resting within the discretion of the legislature in enacting the law. We believe a majority of states now engaged in regulation of motor-propelled vehicles do not undertake the regulation of companies operating exclusively within city limits. This is a matter, of course, to be determined by the legislative policy of each state. If it is desired that such power be exercised, this exception should be stricken from the definition of auto transportation companies contained in the proposed act.

It will also be noted that motor-propelled vehicles, operated exclusively in the transporting of agricultural, horticultural, dairy or other farm products from the point of production to market, are excluded. This is a wise provision, particularly in the Western states, where the movement of bulky crops, such as apples or wheat, requires the use of every available truck in the vicinity for a short period of time. To require every truck engaged in hauling wheat or apples from the field or orchard to the railway station or local market to secure a certificate of convenience and necessity, furnish a bond, and conform to other regulatory details, would place a needless burden upon producers, operators, and regulatory bodies alike. School buses are also excluded. There may be a difference of opinion as to this exclusion. We are inclined to the view that they should be excluded but that some legislation should be enacted requiring such buses to be insured or bonded so as to provide indemnity for careless operation.

Certificates for Class A Only

Another question might be asked: Why require Class A companies to secure certificates of public convenience and necessity and at the same time authorize the granting of permits with very little restriction to Class B companies? It would be impracticable to apply the certificate of public convenience and necessity to Class B companies as they are not limited to any definite route or schedule, and often operate in a wide stretch of territory. To determine whether public convenience and necessity requires an additional operator in this class would be a hopeless and impossible task. The fares, character of equipment, and method of operation can be properly regulated, and competition will largely eliminate the unfit. The regulation of fares will prevent the elimination of the smaller operators by the more powerful concerns through rate wars.

Insurance

That portion of the act relating to insurance should be drawn in harmony with the insurance laws of the particular state. Some legislatures have made the mistake of requiring too large a bond or insurance policy, compelling the payment of premiums almost prohibitive to many small operators. This provision should be flexible so as to permit the regulatory body to make reasonable regulations under which a small operator in a sparsely settled territory would be required to pay a much smaller premium than a large operator in a densely populated district.

REASONS FOR PROPOSED FEE SCHEDULE

The proposed act undertakes to make regulation of auto transportation self-sustaining by requiring payment of certain fees by the companies. We believe this to be wise policy; first, because auto transportation companies enjoy certain privileges in the use of the public highways which other transportation companies do not enjoy, and, second, because the regulation of auto transportation is much more expensive in proportion to its volume than is the regulation of any other kind of transportation or any other public utility. Furthermore, it is doubtful, in view of the heavy burden of general taxation already existing, if the regulation of auto transportation would be undertaken by many states without some provision requiring operators to pay the cost of such regulation. The fee system which is proposed in this act is based largely upon the experience of the Department of Public Works in the State of Washington. It is believed that not to exceed 1 per cent of the gross operating revenue of auto transportation companies, together with the miscellaneous fees provided in the act, will yield a sufficient fund to finance the regulation of auto transportation companies in any state.

TAXES FOR USE OF HIGHWAYS

The fees so far discussed are those accruing to the state regulatory body for the sole purpose of covering expense of regulation. Some states are exacting certain taxes from motor vehicle companies as compensation for the use of the highways built and maintained at public expense. It is very likely that exactions of this character will ultimately be made in all of the states. There is a growing sentiment in favor of such a tax and a feeling upon the part of the public that stage and truck competition as now permitted is unfair to rail carriers, who are compelled to purchase right-of-way, construct grades, lay ties and steel, and maintain such structures at their own expense and pay taxes thereon.

While the exaction of taxes from auto transportation companies other than a sufficient amount to cover the expense of regulation is more properly a function of the taxing authorities of the states, it may not be improper briefly to discuss the same in this report. The statute which we have proposed places trucks and for-hire cars under regulation so that it will be possible to require such concerns to furnish statistical information upon which a reasonable tax may be formulated. To impose a gross revenue tax upon the earnings of vehicles operating between fixed termini and over a regular route without imposing an equal tax upon truck and passenger vehicles not so operating would work an injustice.

For instance, in the State of Washington, 36,323 truck licenses have been issued thus far in the year 1923. Only 284 of these are subject to regulation under the statute, which applies only to operations between fixed termini and over a regular route; 2,098 licenses have thus far been issued in 1923 for stages and for-hire cars, of which only 656 are subject to regulation.

About a year ago, the Department of Public Works of the State of Washington placed inspectors at strategic points on the highways who kept a check day and night for a limited period of all traffic being handled by trucks over the highways. This check disclosed that only about 20 per cent of the traffic passing such points was being transported by regulated freight carriers. No doubt a similar state of facts exists in other states.

If the proposed act should become a law, all of the concerns engaged in the transportation of either persons or property for compensation would come under some form of regulation and could be required to make such reports and furnish such statistical information as would enable a proper tax to be imposed.

There is still another class of vehicles, such as trucks engaged by private industries in transportation of their own products, such as oil companies, logging and lumber companies, creameries, and so forth, in relation to which difficulties would unquestionably arise in the imposition of a tax as compensation for use of the highways. It is also true that trucks so operated, though likely to escape the taxes imposed upon common carrier operators, are usually more heavily loaded and more injurious to the highways than those of any other class.

GASOLINE TAX

At the present time the only form of taxation that operates equitably upon all users of the highways is the gasoline tax. Such tax would, of course, affect all who use the highways in proportion to the use they make of the same. The heavier the load, the more gasoline required to transport it. The only difficulty is that the gasoline tax must be paid by those who use the highways for pleasure as well as those who use them for profit. A number of states now impose a gasoline tax of two cents per gallon, which yields a handsome revenue. To increase this tax would work no injustice to the operators who use the highways for commercial purposes but, in the opinion of many, would be unjust to private car owners, who do not use the roads for gain and who have borne their share of taxation for the construction of the same. In any event, it is doubtful if legislatures will be inclined to increase the gasoline tax beyond the 2-cent limit unless the excess over the two cents could be made to apply to commercial users of the highways only; and, to make such distinction, would result in great difficulty and uncertainty of administration.

In imposing any form of taxation based on gross operating revenue, care should be taken not to destroy small operations in isolated regions. If it can be legally done, a reasonable return might be permitted tax-free to each auto transportation company, such return to be based on the value of the property devoted to public use. The rate of return might properly be prescribed by the state legislature and the value upon which it is based determined by the state regulatory body. All revenues in excess of such reasonable rate of return could then safely be taxed for the purpose of building and maintaining highways. In this way, the small operators, whose rate of return is usually low, would not be eliminated; and the larger concerns in thickly settled communities, whose operations are usually in competition with established rail and boat lines and whose earnings are usually ample, could be more heavily taxed without injustice.

ACCOMMODATIVE SERVICE EXCLUDED

In defining the words "for compensation," the following exception is made:

"An occasional accommodative transportation service by a person not in the transportation business, while on an errand for himself, shall not be construed as a service for compensation, even though the person accommodated shares in or pays the cost of the service."

The purpose of this provision is to save the kindly disposed individual and the regulatory body the annoyance occasioned by complaints arising from the occasional accommodative transportation of an article or of one person by another. In other words, regulation should not be so hidebound that a man could not accommodate a neighbor without violating the regulatory statutes.

Unions Must Develop Responsibility

DR. WILLIAM STARR MYERS, professor of politics Princeton University, was the principal speaker at the annual dinner of the New York Railroad Club, held at the Commodore, New York, Dec. 6. Dr. Myers' address was entitled "Thoughts on Our Present Discontent." Expressing himself as favoring the existence of labor unions, he also advocated the open shop—not "a shop open to none but non-union men, but to union and non-union men without distinction." He advocated making the unions really democratic by breaking up the "close corporations" of union leaders who control policies and finances, and the incorporation of the unions. He declared that they should assume the legal responsibilities commensurate with their rights and that if the unions did not reform themselves, it might be necessary for the government to step in and control their elections and their finances. The difficulty of today, he said, is not primarily with the rank and file of labor, but with the leaders, who seldom are elected by really democratic methods, who have control of the policy of the organization, are practically a self-perpetuating and "close corporation" in many cases, and are totally irresponsible for the administration of the finances.

The dinner was the largest ever given by the club and about 2,600 were said to have been present.

Resolutions and Further Committee Reports of Commissioners

Would Clarify Jurisdiction of State Commissions and Interstate Commission and Have Latter Value Railroads by States—Conference to Be Called on Crossing Accidents

At the closing meetings in Miami last week of the National Association of Railway & Utilities Commissioners, the following were elected officers for the ensuing year:

President, Henry G. Taylor, chairman Nebraska State Railway Commission; first vice-president, W. D. B. Ainey, chairman Public Service Commission of Pennsylvania; second vice-president, A. G. Patterson, president Alabama Public Service Commission; secretary, James B. Walker, secretary New York Transit Commission; assistant secretary, Lewis G. Thompson, Florida Railway Commission; general solicitor, John E. Benton.

Resolutions of Interest to Electric Railways

Resolutions passed, of interest to electric railway companies, included the following:

That Congress be urged to make such amendments to the existing transportation law as shall clearly exclude from the jurisdiction of the Interstate Commerce Commission the regulation of the rates and service of electric railroads carrying on local street railway transportation.

That the president of the association call a national conference, consisting of representatives of the carriers, state regulating commissions, governors, highway commissioners, municipal officers and national automobile associations, to see what can be done to reduce accidents to automobiles at railroad grade crossings.

That Congress be urged to supply the Interstate Commerce Commission with sufficient funds so that it may report valuations of railroads by states, as well as by entire systems, the commission having reported that it has been unable to make this division in the past because of lack of funds.

That Congress so amend the interstate commerce act as to remove all question of continued power of the state authorities to require common carriers to make additions and betterments to their plant and facilities reasonably necessary for the safe and proper service of the public; that no intrastate rates may be changed or set aside without proof by competent evidence that such rate seriously affects interstate commerce, and that Congress amend the transportation act of 1920 so as to restore to the several states all the rights, powers and authority enjoyed by each state relative to certificates of convenience and necessity prior to the enactment of that act.

The report of the committee on valuation related principally to the Great Northern and Rock Island (steam roads) valuation cases. It is pointed out that the theory of the Great Northern Railway is that for the purpose of valuation it is assumed that the railroad is non-existent and therefore no portion of it available for the transportation of men or materials for the construction of other portions, and that the entire 7,000 main track miles will be reproduced in from two to three years. Under this theory, material would necessarily be transported over foreign lines of railroads and no part would be hauled over the lines of the Great Northern Railway itself, and the freight on the material hauled would be paid for at class rates. Such an assumption, the report says, is illogical.

A supplement to the report considers the question of valuation of ill-conceived railroads, in connection with one or two recent decisions on this subject on steam road valuations by the Interstate Commerce Commission. The committee believes that for such properties the method of determining value by means of the cost of reproduction is not appropriate.

Other Reports

The committee on uniform regulatory laws submitted an extended study of the railroad and utility laws in the different states. It makes up a printed pamphlet of more than 300 pages, the statutes on the same subject, as in existence in the different states, being grouped together. Many differences are found.

The committee on motor vehicle transportation submitted a report, of which an abstract appears in another column.

The committee on statistics and accounts of public utilities reported on a uniform classification of accounts for electric, gas and water utilities.

Further report on the proceedings at Miami will probably be published next week.

Subway Car Design Topic at A. S. M. E. Meeting

"Modern Subway Cars and Their Operation," a paper by Selby Haar, assistant electrical engineer with the Transit Commission of the State of New York, was the principal topic at the meeting of the Railroad Division of the American Society of Mechanical Engineers, Dec. 5. E. B. Katté, chief engineer electric traction, New York Central Railroad, acted as chairman.

The paper by Mr. Haar gave various details of the steel car construction and equipment of trains used by the rapid transit lines in New York. These details have been published from time to time in various issues of Electric Railway Journal. Mr. Haar also referred to measures undertaken to overcome congested conditions in the subway so as to bring about a reduced time for loading and unloading passengers, thus reducing the time for station stops. This has enabled the operation of trains on more frequent headway, and the length of trains has also been increased, this latter requiring increased length of platforms. Ten-car express trains are now operated and six-car local trains.

Mr. Haar also referred to the development of the articulated train and declared that this type was being considered among other new designs for future equipment of the New York subways. According to the tentative designs, four units of this type will be substantially as long as eight of the standard cars. Each unit has a body of three sections, articulated and supported on four trucks. A special feature is that no intermediate end doors will be used, and there is but one guard for each unit and he is located at the end of the unit. Preliminary designs have wide single side doors instead of pairs of narrower doors.

The discussion following the presentation of Mr. Haar's paper showed the attention which has been given by designers of cars and equipment intended for New York subway service toward increasing schedule speeds, decreasing the length of station stops, and providing for the comfort and safety of passengers.

F. M. Brinckerhoff, who as a member of the L. B. Stillwell firm of engineers has devoted considerable time to the design of cars for New York subway service, described some of the features of the Brooklyn-Manhattan Transit Corporation's cars which were mentioned in Mr. Haar's paper. Mr. Brinckerhoff brought out the fact that in the development of this design considerable attention has been given to rapid interchange of passenger movement and to produce as light a car body construction as was advisable, in view of the extreme service to which this equipment is subjected.

Joseph C. McCune, district engineer Westinghouse Traction Brake Company Company, New York, described some of the advantages of the electro-pneumatic brake equipment and the empty and load brake device as installed upon the Brooklyn-Manhattan Transit Corporation's cars. He brought out the fact that the improvements in air-brake equipment had done considerable toward decreasing the congestion of rapid transit operations by providing increased rates of retardation, quick release of brakes and rapid recharge of the air-brake system. He said that the distance for a stop of the Interborough trains from a speed of 40 m.p.h. has been more than cut in two by improvements in air-brake equipment and that the time taken to stop from this speed has been decreased one-third. Mr. McCune also described the features of the automatic air and electric couplers as used on subway equipment, and gave some illustrations of the saving in time that resulted in making up trains for service.

Fred Butt, of the equipment department of the New York Central Railroad, gave some figures of the detentions in multiple-unit train service on the New York Central and asked several questions as to the value of certain equipment used on subway cars. H. L. Andrews, railway engineer General Electric Company, told of the efforts which his company had made to reduce the fire hazard on subway equipment by adopting flameproof and heat resisting insulation. He also spoke of the advantages of articulated units for train operation, and as evidence of the economies effected he declared that a three-car unit would have but four trucks and four motors, while three individual motor cars would require six trucks and at least six motors. The recently constructed two-car articulated unit used in Detroit has a weight of but 550 lb. per passenger seat.

George L. Fowler, consulting engineer, New York, told of the reasons for removing the coupler centering devices on the Brooklyn-Manhattan Transit Corporation's cars. The supporting attachment to the truck used to keep the couplers accurately centered produced large strains with danger of derailment. He also spoke of an investigation which he had made into the excessive nosing of these cars, which was found to be due to too free oscillation of the car body.

American Association News

Midyear Dinner Committee

THE committee on arrangements for the midyear meeting to be held in St. Louis, March 4, met in St. Louis on Dec. 11. It was decided to hold the meeting at the Hotel Chase, and E. B. Meissner, E. D. Payne and H. D. McBride were appointed a sub-committee to conclude negotiations with the hotel management.

The committee plans to engage the Chase Hotel orchestra, which is said to be one of Paul Whiteman's best. There will be special entertainment during the dinner. It was decided to print menu cards suitable to the occasion. It was planned to have a definite assignment of tables and places for all those whose reservations are received by Monday noon, March 3.

On the question of entertainment for the ladies, the committee thought that they could be well taken care of without the association making any special arrangements.

B. W. Frauenthal was designated to take up the matter of transportation to determine whether arrangements could be made for fare at one-half rate, as was done for the Atlantic City convention.

A hotel reservation sub-committee was appointed to follow all details of giving each member the rooms he wanted in so far as available. It was brought out that all attending the meeting can probably be taken care of within a radius of three blocks of the Hotel Chase. Frank O. Grayson, St. Louis, was appointed chairman of the hotel reservation committee.

It was suggested that an informal get-together meeting be held on Monday night, just prior to the midyear meeting, and it is probable that this will be handled by the Birney Club, St. Louis. An organization committee was appointed for this purpose as follows: C. O. Birney, chairman; B. W. Stemmerick, R. W. Williams, Herman Spoehrer and B. W. Frauenthal.

The committee on arrangements will probably not hold another meeting until February of next year.

The following members of the committee were present: W. H. Sawyer, chairman; E. B. Meissner, F. G. Buffe, V. W. Berry for G. H. Clifford, L. E. Gould, H. J. Kenfield, C. E. Allen for M. B. Lambert, A. T. Perkins, Ernest Stenger, E. D. Payne for E. P. Waller.

In addition, Fred A. Kehl, H. D. McBride, J. A. Laird, Mr. Johnson for W. A. Layman were present from the St. Louis Electrical Board of Trade. From the Birney Club of St. Louis, C. O. Birney, Frank V. Cook, Otis E. Turner, F. A. Richards, R. W. Williams, B. W. Stemmerick, F. O. Grayson, and B. W. Frauenthal were present. Fred C. J. Dell represented association headquarters.

Way Committee

A TWO-DAY meeting of the committee on way matters of the Engineering Association was held in New York, Dec. 6 and 7. Those present were H. H. George, chairman; E. M. T. Ryder, C. F. Gailor, W. W. Wysor, W. R. Dunham, J. H. Haylow, E. B. Entwisle, C. A. Alden, R. B. Fisher, V. Angerer, R. C. Cram, sponsor, and G. C. Hecker, special engineer.

The first day was taken up entirely with meetings of sub-committees.

The committee voted to recommend the use of seven standard frogs for all radii of 130 ft. or less, using association standard spirals through the frogs. It was voted to use intermediate radii at even degree angles so as to make them coincide with the length of the curved heel arms for iron bound construction. Standardization of the length of frogs was referred to a sub-committee composed of Messrs. Angerer and Alden.

On the design of substitute ties, sub-Chairman S. C. Baker was directed to secure from the tie manufacturers or elsewhere a list of railways using such ties, extent of use, and particularly how many were placing repeat orders from time to time. It was also decided that a questionnaire should be sent out to all companies using substitute ties with the idea of developing data relative to this subject.

Mr. Wysor reported on the progress of the investigation by the welded rail joint committee. He outlined the status of the schedule of tests and research work recently adopted.

A preliminary report by Mr. Angerer on the design and specifications covering solid manganese crossings was approved.

The subject of standardization of switches and mates was discussed quite extensively. The committee requested each manufacturer member of the sub-committee to prepare and submit drawings showing a specified switch, so that a study can be made to ascertain the possibility of designing a composite switch. On the subject of standard design of narrow groove guard rail, Mr. Entwisle submitted a preliminary report and the sub-committee was instructed to continue the study of this subject.

A progress report was made by Mr. Haylow on the design of a standard hook-head spike, and each member was requested to furnish him with such additional data as they have on this subject.

A report by Mr. Spencer on surface hardening of rails was read, which described the results of recent experiments with this process in Toronto. Various data on this subject were submitted by different members.

Mr. Dunham reported progress on the subject of specification and design of tie rods.

It was voted to refer Specification Ws 10a to a sub-committee for action in accordance with the recommendations of the 1923 way committee.

It was decided to hold the next meeting at Easton, Pa., Feb. 13 and 14.

State Committee Men to Meet

ARRANGEMENTS are being made to have a round-table discussion of all directors of state committees on public utility information at the time of the midyear meeting of the American Electric Railway Association at St. Louis, March 4.

The News of the Industry

Mr. Mayo Discusses Transit

General Manager at Detroit Regards Construction of Underground Lines Downtown as Imperative

William B. Mayo, general manager of the Detroit Department of Street Railways, has issued a statement relative to the plans for rapid transit for the city of Detroit. Mr. Mayo analyzes critically some of the provisions outlined in the Rapid Transit Commission's report and states that in his opinion the conditions to be met in Detroit make it appear that the first logical step to be taken toward rapid transit is the construction of an underground tube in the central district, built first in short sections for surface car operation, but so designed that it can be converted to rapid transit operation.

DEFINITE ENABLING ACT NEEDED

The first consideration is to secure passage by the Legislature of a clean-cut enabling act. After that assistance and thought should be given to the question of the extent of the rapid transit system required in the next five or ten years. Mr. Mayo says that what the city really needs most is increased terminal facilities.

Mr. Mayo believes that careful consideration should be given to the relation between the Street Railway Commission and the Rapid Transit Commission, if the latter is to be a permanent feature, as unified operation can not be guaranteed unless one or the other is made definitely responsible for the transportation of the city's population.

A serious thing to be considered in connection with rapid transit development is the matter of fares. The surface lines must have at least a 5-cent rate of fare until the purchase contract is completed, Mr. Mayo believes, and rapid transit lines cannot operate for less than 10 cents until a ten-year period has passed or the total annual traffic has grown to somewhere near the billion mark.

FINANCING DETAILS DISCUSSED

In regard to the report of the Rapid Transit Commission outlining proposed methods for financing, Mr. Mayo is of the opinion that it is very unfortunate that the present enabling act retains the double column assessment plan. This he thinks should be eliminated. The bill referred to provides for a special assessment district along established routes by a so-called double column assessment. The first column would represent the value of a given parcel of land without a subway; the second column would represent the increase by reason of the subway's construction. The same city tax rate would be levied against both columns, but the proceedings of the column due to alleged increased property value following subway construction would constitute a so-called special assessment fund to be used to pay for the subway work. This, Mr. Mayo believes, would entirely relieve the property owners of any real special assessment for a subway and conflicts with the apparent intentions of the Rapid Transit Commissioners.

If the second plan in the new act were adopted, he cites, the general assessment would be the same as the sum of the two columns suggested in the first plan, but would provide a genuine special assessment against the entire property value.

The new financial plan provides for an assessment at large of 17 per cent and a local assessment of 51 per cent, the balance of 32 per cent being the equipment cost which is to be financed by the car rider from the fares. This plan is not objectionable to Mr. Mayo except in the detail of its application.

Serious consideration of the metropolitan area and the Port of Detroit plans are recommended because the present transit plans contemplate the whole proposition as a local one.

Another feature of the enabling act to which Mr. Mayo called attention is the fact that the act seems to assume that all of the costs of changing gas and water pipes, telephone conduits, etc., shall be considered part of the cost for the subway. Inasmuch as a tremendous strain would be put upon the taxing power by the cost of the subway, it is apparent to Mr. Mayo that the settlement of this question should be a discretionary one instead of compulsory.

Moving Pictures to Tell Story.—Motion pictures are to be used in telling the story of the growth and development of many public utilities properties in the Central West, knit together in the Illinois Power & Light Corporation, formed last June by the merging of the McKinley and Studebaker interests. Pictures of the various properties and industries served will be taken in Illinois and Missouri. The pictures will show the tremendous growth of the public utility business and particularly the development of the many properties now under the management of the Illinois Power & Light Corporation, which operates a very large trunk line interurban railway and numerous city railway systems in seven states.

Recent Session of Union

One-Man Cars, Seniority and Other Matters Discussed by Amalgamated at Oakland Meeting

W. D. Mahon, international president of the Amalgamated Association of Street & Electric Railway Employees of America, reiterated his stand for the eight-hour day at the recent meeting of the association at Oakland, Cal. Mr. Mahon advocated one day rest in seven. Among other things he said that contracts covering labor agreements should be for two years instead of one and that there should be arbitration without suspension of work.

SENIORITY RULE DISCUSSED

During the proceedings a delegate from Vancouver suggested changing every two or four weeks between the day and the night men. The present association rule calls for seniority in selecting runs. The association voted for a pension plan for men members of more than twenty years' standing who had reached the age of sixty-five.

Mr. Mahon indicated that the one-man car was here to stay. The attitude of the officers of the association toward the one-man car was that the locals should try to get as much extra wages as possible for operating this type of equipment. It was recommended that the locals should be permitted to handle this matter. With further regard to the operation of these cars, Mr. Mahon said the men should be protected at crossings.

WOULD FIX SIZE OF ONE-MAN CAR

A recommendation was adopted favoring the passage of a law against one-man cars except those not more than 25 ft. long, with seats for not more than thirty passengers, equipped with an emergency exit door and automatic emergency control and brake, and on which the operator is not required to collect fares while engaged in operating the car.

It was further voted to increase the dues of the association.

In a talk which he made on the situation affecting the former employees of the International Railway, Buffalo, Mr. Mahon said:

> Members of the Amalgamated throughout the country stood by the men in Buffalo and I want to say to their everlasting credit that they have helped to preserve the Amalgamated, and "Mittenism" is as dead as a door nail in the United States and Canada today.
>
> My friends, what we have done in Buffalo has set a lesson; it has shown what we can do; and if all our members will only be as true and loyal as the men of Buffalo, and stand as they have stood, they will never defeat the Amalgamated Association on this continent.

Massachusetts Towns Worried

Begin to Fear for Their Future at Prospect of Withdrawal of Railway Service—Review of Affairs Affecting More than 80 Miles of Road

HOPE has been shattered that the Massachusetts Supreme Court would prove a modern Moses in showing the Northern Massachusetts Street Railway a way out of its sea of financial difficulties, enabling it to continue operation of its lines. Foreclosure by bondholders on Dec. 31 has been ordered unless the property has been disposed of as a whole, or in part, prior to that time. D. P. Abercrombie, the receiver, has been authorized to continue or discontinue service on all or any lines of the corporation at any time he may see fit, but it is anticipated that he will operate the greater part of the road until Dec. 31.

PUBLIC SHOWS ITS CONCERN

Threatened with the loss of virtually their only public means of transportation the residents of the possible trolleyless territory are beginning to show real concern. Gardner, one of the principal centers of the system, has asked its City Council to take action to provide transportation for residents, Templeton residents complain the town will be hard hit by the suspension of the lines, storekeepers and patrons in Athol are disturbed, and in the other towns served by the railway there is a growing realization of what the loss of the trolleys will mean.

The Northern Massachusetts serves far-flung territory, not very populous, it is true, but territory with a network of trackage that has knitted together a big section of the northern part of Worcester County. Even so, the facilities afforded by the railway have been at the command of approximately 125,000 persons, if not more. Nevertheless, in this territory there lives the type of suburban resident who believes in the convenience, yes, and even the necessity, of the automobile. The discontinuance of the lines will be no great hardship to this class of patrons except possibly during the winter months. The automobile owning class, however, is restricted in numbers. On the other hand, many daily wage workers will suffer who have not acquired the wherewithal for maintenance of motor cars.

At Orange, one of the extremities of the line, there is not much call for transportation of workers. It is a small town and few live sufficiently far from employment to find the trolley a convenience. It is, however, a necessity in travel to other towns. Starting there, the line runs to Athol, another thriving manufacturing town, spread out more and with greater need for adequate transportation facilities. This branch was formerly the Athol & Orange Street Railway. At one time, the travel between Athol and Orange was heavy.

The largest center beyond Athol for the Northern Massachusetts is Gardner, a city of population estimated at close to 20,000. Big chair factories and other industries abound. While the working forces at Gardner are recruited largely within the city, the suburban territories send no small number of laborers. Gardner has two central villages and the travel between them is heavy. It has more modern stores than have surrounding towns and over the weekends draws throngs of shoppers, many of whom have found the trolley a necessity. The shopkeepers are the persons who really are worried at the passing of the trolley. They fear it will affect business, but are hoping there will come a way to meet the emergency.

Gardner is the center for the lines that pass through Templeton and its villages, where are virtually no trading centers. From Gardner there is also a branch that runs to Winchendon, another large town, the residents of which find the trolley very useful in traveling to the larger trading centers. There is a summer park between Winchendon and Gardner, maintained by the railway, that enjoys large patronage.

From Gardner the Northern Massachusetts main line runs through Westminster and into West Fitchburg, connecting with the lines of the Fitchburg & Leominster Street Railway. Fitchburg is an industrial city of 43,000 with up-to-date stores. It is the objective of residents living in towns and cities to the northwest, the very territory which the railway serves.

NO HELP FROM STEAM LINES

The railroads offer no avenue of escape to the residents confronted with the prospects of losing the trolley. There is passable steam service between Gardner and Fitchburg, but that is the extent of the railroad convenience offered. Between the other towns and cities now served by the trolley trains are few and far between and offer little inducement for travel by that means. They have not been a convenience and in many of the towns the railroad station is an impossible distance from the main village.

Other inconveniences are threatened. Three of the post offices, Templeton, East Templeton and Otter River, all receive mail by trolley. The accommodating trolley has also carried books between the branch libraries. Students attending the high school in Baldwinville, one of the villages of Templeton, are transported by trolley, as are many children attending elementary schools.

Residents of Templeton, overlooking their own patronage of the bus, place the blame for the predicament of the trolleys on the selectmen and the Gardner City Council. They declare the decrease of the trolley receipts is mainly due to issuance of jitney licenses.

In fact, Templeton is taking the trolley passing more to heart than most of the towns. Leading residents fear the discontinuance will seriously hurt the few industries in its various villages as virtually all of the manufacturing plants get their fuel by way of the trolley. The discontinuance of such service will mean a long haul of coal as well as increased expense.

At a meeting in Athol on Nov. 26 it was voted to institute steps for the purchase of the section of the Northern Massachusetts Street Railway running between Athol and Orange, with a view to maintaing this line in operation after retirement of the Northern Massachusetts on Dec. 31. A committee composed of representatives of the two towns was appointed to canvass for subscriptions for the purchase of the line. Although sentiment favored the electric railway, a proposal has been made to put on several buses between the two towns.

Gardner's next move is, perhaps, the most eagerly awaited, for the trolley abandonment will be of direct concern to a larger number of people there than any other place. Already experts from a bus company are preparing a survey and report for the installation of a permanent bus line to take care of every possible transportation need. There are buses now in operation between some sections of the city drawing their chief patronage from the workers in the factories. There is no dearth of taxicabs operating almost on a jitney fare level between the Gardner railroad station and the center of the city known as West Gardner. They claim patronage is encouraging.

The only possibility of Gardner retaining permanent railway service is for the city or private interests to take over a part of the corporation's lines and operate them. This possibility is considered remote.

SIMILAR SITUATION ON CONNECTICUT VALLEY LINE

Judge DeCourcey of the Massachusetts Supreme Court on Nov. 16 ordered a decree entered directing D. P. Abercrombie, receiver for the Connecticut Valley Street Railway, to cease operating all lines of that system by March 1, 1924. The receiver is empowered to issue $10,000 on a receiver's certificate to pay bills. Petitions for foreclosure of mortgages on lines of the Amherst and Turners Falls divisions have been filed. The court advised attorneys to confer concerning the sale of the company's properties and report to the court.

The Northampton Chamber of Commerce has considered how to keep the line from Northampton to Amherst in operation, and it is hoped that the Holyoke Street Railway will take over that line and also the line running from Northampton to Hatfield, operating these lines and allowing the section farther north, through Whately and Deerfield to Greenfield, to be discontinued. It seems probable that the service between Greenfield and Turners Falls will be replaced with a bus service.

Rental the Question—Report Praises P. R. T. Activities

After making a study of transit development in Philadelphia and the question of what rentals the Philadelphia Rapid Transit Company should pay, the transit committee of the Real Estate Board recently submitted a report saying that the issue, so far as new lines are concerned, is up to the new administration.

The report states that the size of the transit property the city will build depends on the amount of rent the Philadelphia Rapid Transit Company can afford to pay. This in turn resolves itself into the question whether it is better for the city to build a small transit property to serve a comparatively small number of people with rapid transit and get a high rent, or whether it is better for the city to build a larger transit property supplying rapid service to greater numbers and accepting a lower rental, but getting the additional interest on the investment through increased real estate values. In the opinion of the Real Estate Board's committee that is the question that will have to be settled in working out an operating agreement.

The report reviews the activities of the company during the present year in the matter of track extensions and new equipment saying that the company spent more this year than in any other year in this respect. Horace Groskin, chairman of the committee, said that this was proof that the Philadelphia Rapid Transit Company had not only kept faith with the worker in higher wages and with the stockholder in dividends, but also with the people of Philadelphia in the matter of service.

Removal of Part of New York Elevated Suggested

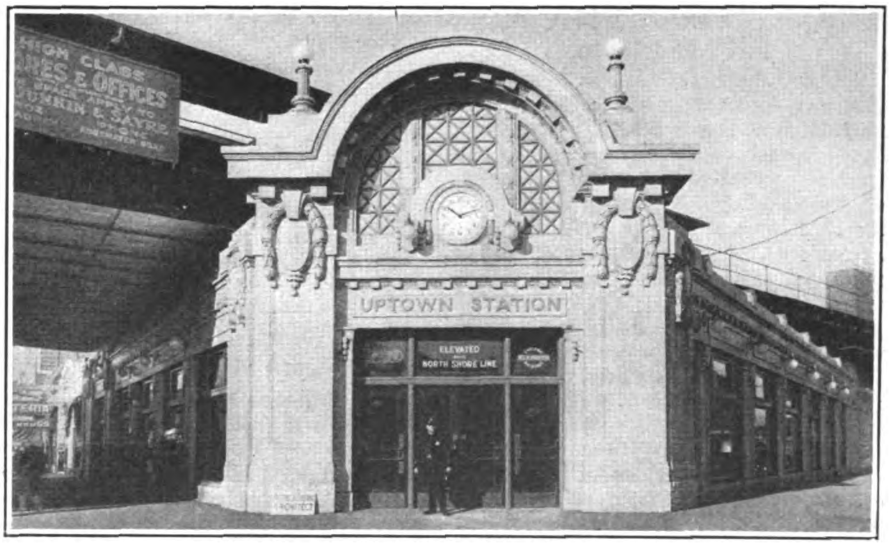
Julius Miller, Borough President of Manhattan, has proposed that the Sixth Avenue elevated structure be torn down and that a subway be constructed along its route without incurring the obligation of one cent on the city. His suggestion was contained in a communication to the Board of Estimate. Mr. Miller set forth that owners of property amounting to $20,000,000 along the proposed route from the Battery to Fifty-ninth Street had agreed to submit to an assessment to bear the cost of removing the elevated and building the subway, which is estimated at about $25,000,000. He expressed the hope that the owners of all of the property involved, which totals about $260,000,000, would agree to the project.

At an assessment of one-tenth of the value of the property, Mr. Miller pointed out, the financial burden would be lifted from the city and shifted to those whose property would benefit. He also proposed that the assessment be spread over ten years, which would result in a 1 per cent assessment a year.

Mr. Miller brought his plan up at this time because the Board of Estimate had called a public hearing on Dec. 14 on relocating the columns of the Sixth Avenue elevated structure. He has already asked the Corporation Counsel to frame a bill giving the city the right to go ahead with his project.

Orders Physical Connection in Tulsa

The Oklahoma Corporation Commission has issued an order requiring the St. Louis-San Francisco Railway and the Sands Springs Railway to make physical connection with the Oklahoma Union Railway at Tulsa so as to facilitate the handling of freight in carload lots and less over the lines of the Oklahoma Union Railway. The Oklahoma Union Railway operates an electric interurban line between Tulsa and Kiefer, Okla., a distance of 18.84 miles.

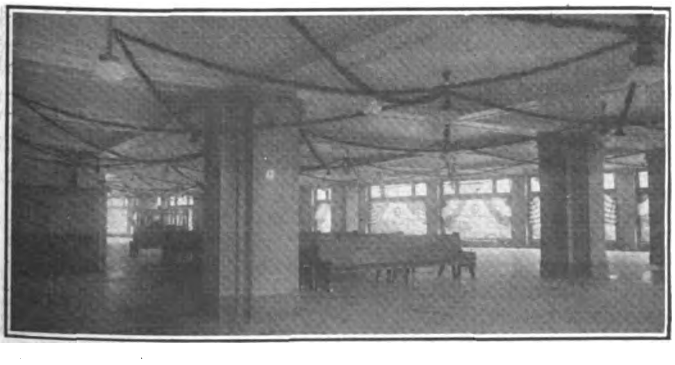


Main Entrance at Wilson and Broadway to New Uptown Station, Chicago

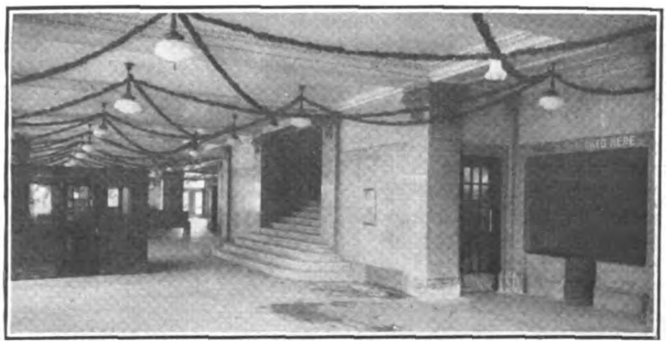
New Uptown Electric Station in Chicago

The Chicago Elevated Railroads and the Chicago, North Shore & Milwaukee Railroad have augmented the station facilities at Wilson Avenue, formerly laid out primarily to serve the elevated, by the construction of a new depot underneath the elevated structure. The new station is of quite imposing appearance, both inside and out. It is located on the north side of Wilson Avenue at the intersection with Broadway, which is at the center of the uptown district on the North Side. It will serve the through passengers of the North Shore line and the Evanston division of the elevated. Local passengers from and to Wilson Avenue will be handled from the station on the opposite side of Wilson Avenue, and therefore the local and through passenger business will be separated.

The building is of brick and tile construction with terra cotta facing. The interior is decorated with art marble for flooring and side walls up to the height of the wainscoting. The grand staircase leading up to the track level is exceptionally attractive and provides a generous passageway for passengers. The total cost of the building, including the cost of removing the building which previously occupied this site and was owned by the elevated railroad, was approximately $200,000.



The Waiting Room Facilities Are Pleasing in Appearance and Generous



The Grand Stairway Leading to the Platform Above; Ticket Booths and Comfortable Waiting Benches Near By

Wages Advanced 1.65 Cents in Philadelphia

As was reported in the ELECTRIC RAILWAY JOURNAL, issue of Dec. 8, the Philadelphia Rapid Transit Company has granted a wage increase to its trainmen, effective Jan. 1, 1924 amounting to about 1.65 cents an hour over the 1923 average scale. Under the new agreement the men will receive 67½ cents and of that 2½ cents will go into the dividend fund. At the end of the year each employee will be credited with 10 per cent of his year's earnings. The new basic rate is placed at 65 cents and with the 10 per cent wage dividend it will amount to 71.5 cents. In 1923 the average rate has been 63.5 cents with a 6.35 wage dividend. Employees of the Philadelphia Rapid Transit Company are paid by agreement according to the average paid in Cleveland, Chicago and Detroit. The increase involves an outlay of approximately $550,000 to the company.

Discussing the wage matter President Dunbar said:

> At the beginning of 1923 the wage based on the trainmen's 62.5 cents per hour was thought to be as high as wages would go. This, with a 10 per cent co-operative wage dividend thereon, was considered possible of accomplishment. When the three-city average wage brought up to 64 cents an hour on May 1 the wage dividend was still thought possible of accomplishment, but when the three-city average went to 67.5 cents June 1 it was at once seen impossible to pay this large increase and in addition pay a 10 per cent co-operative wage dividend.
>
> Upon the explanation being made that the continued purchase of P. R. T. stock for the workers' account depended upon the payment of the full 10 per cent wage dividend, all employees at once agreed that the equivalent of 3.5 cents per hour should be deducted from the three-city average wage, to which they were entitled, and paid to the trustees of the wage dividend fund, the wage of 64 cents per hour being thereby continued.

President Dunbar referred to Mr. Mitten's desire to have the basic wage at 65 cents an hour. He said that the company, however, would have to make up the $50,000 which it was short in the full earning of the present year's $1,850,000 wage dividend, but that even with that in mind he strongly approved increasing the basic wage to 65 cents and endeavoring to earn and pay a 10 per cent co-operative wage dividend during 1924.

Rockford Traction Applies Again for Franchise Grant

The Rockford City Traction Company has made a second application to the City Council of Rockford, Ill., for a franchise grant. The last franchise application was voted down in a referendum on Dec. 12, 1922. In the present application the company proposes not to pay for any new paving or repaving of any street upon which its tracks are now or shall later be laid. It proposes, however, to pay for repairs to pavements within the length of its cross ties, with such materials as may be ordered by the City Council.

With the exception of the paving clause the franchise application is practically the same as the original one, including the rate of fare, double tracks on Seventh Street, relaying of rails on State Street in business districts and extension of lines to city limits on East State Street and to Black Hawk Park on Fifteenth Avenue.

The new traction application makes no provision for a referendum. Early action on the franchise application by the Council is expected.

The company's franchise expired on Oct. 3 last, and the company has been operating since that time on a special permit granted by the Council.

Would Compel Railroad to Halt Cars at Crossing

A hearing was held before the Public Service Commission on Dec. 5 on a complaint filed by the State Bureau of Highways against the Hudson Valley Railway, Glens Falls, N. Y., asking that the crossing at grade at the Waterford-Mechanicsville county highway and said company's railway shall be protected. The crossing in question is located immediately north of Waterford on the highway leading from Albany, Troy and Cohoes to Saratoga and points north. The highway will be reconstructed next season. The State Highway Bureau at the hearing asked for an order directing the cars of the railway to come to a dead stop before crossing the highway. It was shown that there are nineteen passenger trolley cars and four express cars that cross this highway daily, together with about 1,500 automobiles. The automobile traffic will be heavier when the highway is rebuilt of concrete.

The decision of the commission will be announced later and will be received with more than ordinary interest, as the request itself "to bring transportation to a stop before crossing a highway" marks a departure from the accepted practice of a railway crossing a highway, almost since the inception of the railway itself.

Recent Booklets Furnish Excellent Examples of Publicity

Three examples have recently been presented of real efforts by utilities to tell their story to the public through the printed page. The corporations issuing the booklets are the Public Service Corporation of New Jersey, the Middle West Utilities Company and the United Light & Railways Company. The Public Service booklet is one of eighty pages. It covers the twenty-year period of the company from 1903 to 1923. Twenty years of real service furnishes the text. More than 60,000 copies of the booklet have been distributed. The Middle West booklet is one of sixty-four pages. It is entitled "Essential Service in Fifteen States." The United Light & Railways has seized upon the results secured by it during the year 1922 to tell its story. This is essentially an annual report, but it is excellently arranged and has been made most readable by the presentation of considerable material not until recent years regarded as suitable to be introduced into such matter of fact affairs as an annual report.

Full Operation Restored in Saginaw

Full operation has been restored by the Saginaw Transit Company, Saginaw, Mich. It is believed that in this respect a record has been established. It was on Sept. 26 that the car shops were opened and repairs to equipment started. New switches were laid, track and overhead repairs made. Cars were made ready for operation, and twenty-five buses were ordered. Twenty are at Saginaw and in service. Thirty-two street cars are at present available for service.

During the first month's operation with competition from jitneys and only 25 per cent of the equipment in use, the company carried 466,800 passengers. Of these, 393,307 were revenue passengers, 73,027 transfer pasengers and 466 rode on passes. On Dec. 8 the company carried nearly 30,000 revenue passengers. This is much better business than was expected, Charles S. Kressler, general manager of the company, said.

The company has ninety-two operators, nearly all of whom knew little or nothing about street car or bus operation prior to Nov. 1.

The return of street cars has caused a traffic problem. The City Council wants two men on the double-truck cars to facilitate loading and unloading. Mr. Kressler says this means receivership for the company. He advocates the construction of loading docks in the business district to relieve the congestion. The Council will probably follow his suggestion.

Maine Company Seeks Relief from Reconstruction Order

The Public Utilities Commission of Maine will hear the appeal of the Androscoggin & Kennebec Railway, Lewiston, from certain regulations and requirements made by the municipal officers of Brunswick relative to the reconstruction and resurfacing of Main Street in that town. The regulations ordered the railway to reconstruct a certain portion of Main Street and stipulated that the expense of resurfacing the track location should be paid by the company, and the expense of the cement surfacing of the remainder of the street should be assumed and borne by the town of Brunswick. It is the contention of the railway that the municipal officers acted entirely beyond their authority, for it claims that about one-half the total distance named in the order is entirely covered in, and constitutes the subject matter of an order of the Public Utilities Commission, dated July 11, 1921, which is still in force and with which the town of Brunswick has neglected to comply. The company also maintains that the requirement that the company bear the entire expense is unjust and unreasonable, and that the character and kind of paving and resurfacing ordered are unreasonably expensive and unnecessary.

Railway Secures Injunction to Prevent Discrimination.—The Waterloo, Cedar Falls & Northern Railway has been granted an injunction against the city of Cedar Falls, Iowa, restraining the city from enforcing an ordinance compelling buses to follow certain routes within the city limits. The road alleged discrimination by the City Council between buses operated as an adjunct to the railway between Cedar Falls and the Iowa State Teachers College on Normal Hill and buses operated by a rival company.

Franchise Granted.—The franchise of the Tri-City Railway asking permission to operate its cars into Milan, Ill., without further hindrance was granted T. C. Roderick, general manager of the Illinois division, by the Milan village board of trustees in session. The franchise is for twenty years.

Elevated Will Be Continued.—Contrary to statements early in 1923 that the Public Utilities Department of Seattle planned to abandon the municipal elevated railway paralleling the waterfront, Superintendent of Railways D. W. Henderson states that the elevated will be continued in use, as at present. In order to reroute the cars so as to abandon the elevated, it would be necessary to build a long trestle, an expensive structure for which the Seattle Municipal Railway has no funds available at present.

Must Explain Failure to Build.—The Wisconsin Railroad Commission, concerned at the thirteen years' delay of the Milwaukee Western Electric Railway to begin construction of its proposed electric railway from Milwaukee to Beaver Dam and from Sussex to Waukesha, has requested executives of the company to appear before the commission at a hearing to present facts, plans and other data involving the building of this line. Certificates granting permission to begin construction and operation of the line were issued in 1910.

Would Reconsider Roof Erection.—The City Council of Youngstown recently passed and later voted to reconsider a resolution authorizing the Pennsylvania-Ohio Electric Company to increase its capital stock to permit the erection of roofs on the loading platforms in Central Square. Council President Backus announced that he had not signed the ordinance because he believed it contained no provision for a decrease in capital stock if later the platforms should be removed. Commissioner Engle added that according to the franchise such increases remain permanent. The amount involved is $3,000.

Will Investigate Accidents.—John P. Stouch, former city commissioner and city controller, has been named as investigator of accidents, in the claims department of the Altoona & Logan Valley Electric Railway, operating in Altoona, Tyrone and Hollidaysburg. The position is a newly created one. Mr. Stouch will investigate all reports, taking over that branch of the work handled by Attorney Samuel B. Hare.

Hearing on Shawmut Branch.—The Public Utilities Commission by an act of this year's Legislature held a hearing recently to determine what price, not exceeding $1,000,000, the city of Boston should pay the New York, New Haven & Hartford Railroad for the tracks, roadbed and other equipment of the Shawmut Branch. The act provides for the purchase by the city of the Shawmut Branch in connection with the new rapid transit extension in Dorchester, which, it is estimated, will cost about $4,000,000. This extension has been referred to previously in these columns. Attorney Joseph P. Lyons, assistant corporation counsel for the city, who attended the hearing, said the city in financing the project would make a profit because the act provided that the Boston Elevated, which is to use the tracks, shall rent the property from the city and shall pay one-half of 1 per cent more than the city pays in interest on the bonds, this amount to be placed in sinking funds and used to pay off the bonds. The city, according to Mr. Lyons, would therefore ultimately get its money back and still own the branch.

Foreign News

Progress Slow on Central American Property

During 1922 some progress was made on the Government railway (Ferrocarril de los Altos) to connect Quezaltenango with the International Railways of Central America at San Felipe. Work was begun on this railway several years ago, but because of the war, the difficult engineering problems involved, and heavy construction costs, progress has been very slow. The motive force is to be electricity. The electric equipment and railway material are being purchased in Germany.

Trolley System as Auxiliary in Salvador

It is proposed to install a trolley system to replace the storage-battery cars now running on the main line of the International Railways of Central America, Salvador Division. This trolley system will be used merely for trips through the main streets of the city of San Salvador to and from the station.

Electrification Progress in London District

Electrification plans of the Southern Railway of England are progressing and construction work is now being begun. This company is a consolidation under the railways act of 1921 of the London & Southwestern Railway, the London, Brighton & South Coast Railway and the Southeastern & Chatham Railway. Each of these companies had electrification schemes for its suburban lines leading out of London, the first two for extensions and the Southeastern for an initial installation.

The accompanying map shows the extent of the electrification ordered. On the southwestern section, formerly the London & Southwestern Railway, plans have been approved for the extension of the electrification to Guildford and Dorking. This work, along with that on the other sections, will cost about £5,000,000, and it is intended that it will be completed by the end of 1925. The arrangements will provide for carrying on the electrified lines 200,000,000 passengers per annum.

Altogether the Southern Railway now has 85 miles of route and 248 miles of track of electrified lines. This will be increased to 145 miles of route involving 358 miles of single track.

The following figures give the estimated cost of the electrification.

LONDON, BRIGHTON & SOUTH COAST SECTION	
Line equipment	£276,600
Motors and trailers	395,000
SOUTHEASTERN SECTION	
Conductors and rails	£786,000
Electric equipment of rolling stock	730,000
Substations and d.c. feeders	720,000
Conductor rails and track bonding	515,000
Electric light and supply system	200,000
High-tension feeders	315,000
Repairs to stations	300,000
New car sheds	100,000
Repair and inspection shops	110,000
Signaling, permanent way, drainage, etc.	324,000
SOUTHWESTERN SECTION	
Extension to Guildford and Dorking	£840,000

The "Underground" Extension to Hendon

The London Electric Railways has opened its extension from Golders Green to Henden, Central, together with an intermediate station at Brent. The new portion of railway is 1.63 miles in length. The work includes, in addition to the two new stations at Brent and Hendon, an enlargement of the Golders Green Station, a fine girder bridge across the Golders Green Road, and a viaduct, 30 ft. high, over the River Brent. An extension, 3.05 miles in length, is also under construction forward to Edgware, with intermediate stations at Colindale, 1.31 miles, and at Burnt Oak, 2.21 miles from Hendon. From the terminus at Edgware to that at Clapham Common will be 16.44 miles, which will be covered, without any change of carriage, in 49 minutes.

Line Under Construction in Bolivia

An electric line in Bolivia, 56 miles in length, is under construction. It will extend from the town of Cochabamba toward Chemore.

Financial and Corporate

Reorganization Affairs Reviewed

Committees Representing Kansas City Railways Holders Issue Appeals and Consider Prospects

A circular dated Dec. 8 has been addressed to the noteholders of the Kansas City Railways to inform such holders regarding the status of affairs of the Kansas City Railways. Accompanying the circular is a preliminary report of the reorganization committee. It is explained that the reorganization committee was formed recently through action taken by the committee representing the noteholders and by the committee representing holders of first mortgage bonds.

The membership of this committee is composed as follows: Melvin A. Traylor, president of the First Trust & Savings Bank, Chicago, chairman; H. L. Stuart, Halsey, Stuart & Company, Inc., Chicago; J. K. Newman, Newman, Saunders & Company, Inc., New York; J. F. Downing, president of the New England National Bank, Kansas City, Mo., and P. W. Goebel, president of the Liberty National Bank, Kansas City, Mo., and the Commercial National Bank, Kansas City, Kan.

COMMITTEE REPORTS PROGRESS

The reorganization committee explains that it is doing everything possible to expedite reorganization. It says that it has made a tentative settlement of the litigation, controversies and claims arising as a result of personal injuries and damages prior to the receivership. This settlement contemplates that a plan of reorganization will be submitted in the near future for approval by the various security holders and other creditors. The committee says, however, that in the event an adjustment of the various claims against the company is not secured the first mortgage upon the property will be foreclosed.

So far as the operation of the property is concerned, the committee explains that for the first ten months of 1923 the total income from all sources was practically the same as for the similar period of 1922. Net earnings, however, showed an increase. Revenue passengers for the first ten months of 1923 numbered 112,436,921, as compared with 112,325,578 for the first ten months of 1922. In view of the very intense jitney competition at the commencement of the receivership, the elimination of the jitney as a factor in transportation at Kansas City is regarded as a very important accomplishment.

On Dec. 7 the holders of the second mortgage bonds, Series A and B, of the Kansas City Railways were addressed in regard to the affairs of the company. At the suggestion of a number of holders of these bonds a committee has been organized consisting of Eugene V. R. Thayer, New York, chairman; Frederick J. Horne, vice-president of the New York Trust Company, and H. P. Wright, H. P. Wright Investment Company, Kansas City.

The original protective committee represented all issues of the funded debt. As the circular to the holders of the second mortgage bonds explains, there were apparent certain conflicts of interest between the issues of securities represented with the effect that the protective committee found it advisable to discontinue representing the bond-secured notes and the second mortgage bonds. The original committee, changed somewhat as to personnel, continued to represent the first mortgage bonds. A separate committee was formed to represent the noteholders. No committee was formed at the time to represent the second mortgage holders. In making its plea for deposits the committee representing the second mortgage holders said:

> Recently, in anticipation of a reorganization, the committees representing the first mortgage bondholders and the secured noteholders appointed from their number a joint reorganization committee. This committee has entered into negotiation with various classes of creditors claiming priority, including the personal injury judgment creditors and claimants, in an attempt to work out an amicable solution of the controversies and accomplish a reorganization without the delays and expense incident to final judicial determination of the issues involved in the litigation. Conditional agreements have been arrived at between certain of the interests. The court has indicated a desire, and it is obviously essential, that representatives of the second mortgage bondholders be constituted and empowered to negotiate and, if found advisable, conclude amicable agreement with reference to the second mortgage bonds, or, as an alternative, to continue the litigation if need be.

As has been indicated previously in the ELECTRIC RAILWAY JOURNAL, the court has set Dec. 27 as the day for hearing and passing upon such agreements as may have been made between the various claimants and has stated that, in the event substantial progress toward amicable adjustment has not been made at that time, the matter will be set down for judicial determination on Jan. 7.

Receiver's Duties Extended

A. L. Reynolds, general manager of the Washington-Virginia Railway, has been appointed receiver for the property of the company in the District of Columbia by Justice Hitz in the District Supreme Court. Mr. Reynolds had previously been appointed receiver for the company in Virginia by Judge Brent in Circuit Court at Fairfax.

Provides for Expansion

United Light & Railways Company Arranges for Larger Capitalization —Special Dividends Declared

Changes in the corporate structure of the United Light & Railways Company, Grand Rapids, Mich., to provide for prospective growth and development have been announced.

At the present time the combined debt and capital stock of the company, at face value, total $55,917,253, the capitalization of outstanding stock of the United Light and subsidiary companies in the hands of the public amounting to $23,120,453 and the fixed debt totaling $32,796,800. The new capitalization will be "substantially larger," it is announced.

The corporate title of the new company will be the United Light & Power Company. It will be organized under the laws of Maryland. The present company is a Delaware corporation. Elimination of inheritance taxes for non-resident stockholders, issuance of stocks of no par value, and distribution of more profitable securities to stockholders are listed as some of the major advantages of the new plan.

All of the assets of the old company, subject to mortgage liens and indebtedness, will be sold to the new United Light & Power Company, and the securities of the latter will be distributed in equitable proportion, according to classes and preferences, to the stockholders of the United Light & Railways Company, the present corporation.

It is announced in the same connection that the old company will acquire in the near future all of the common capital stock of the Iowa Electric Power Company, which will construct, own and operate a large power plant on the west bank of the Mississippi near Davenport, Iowa. Erection of this power station has already been announced in this publication.

The Grand Rapids, Grand Haven & Muskegon Railway, the Mason City & Clear Lake Railroad and the Tri-City Railway are among the railways controlled by the company.

DIVIDEND DECLARATIONS ANNOUNCED

At a meeting of the board of directors of the United Light & Railways Dec. 6 the regular quarterly dividend of 1½ per cent was declared on the first preferred stock of the company, payable Jan. 2.

There was also declared the regular quarterly dividend of 1¾ per cent on the participating preferred stock of the company, payable Jan. 2. A special dividend of one-quarter of 1 per cent on the participating preferred stock, payable Jan. 2, 1924, was declared at the board meeting which was held on March 8 last.

There was also declared the regular quarterly dividend of 1¼ per cent and an extra cash dividend of three-quarters of 1 per cent on the common stock of the company, payable on Feb. 1, 1924, to common stock holders.

Selling Stock Part of Employee's Job in Quincy and Peoria

All divisions of the Illinois Power & Light Corporation, Chicago, are actively engaged in the campaign for selling the 7 per cent preferred stock which is being offered only in the State of Illinois. Large cards advertising this stock will be placed in the interurban cars, and folders describing the stock and how it may be purchased will be carried in all the cars. The cars in Peoria and Quincy are now carrying front-end banners reading "7 37/100 per cent with Safety—Ask the Conductor." Here it is that the conductor has the advantage of explaining in detail how it is possible to invest in the preferred stock of the Illinois Power & Light Corporation on a basis that gives a liberal and regular return. In many cases, according to "Current Topics," the official publication of the company, sales of stock have been traced directly to the conductor. This method of advertising is being used in Peoria and Quincy first, as these divisions furnish transportation service only and the employees there do not have the advantage of talking to their customers over the counter as do the employees of the electric and gas properties. Employees of the Illinois Power & Light Corporation are still privileged to buy its 7 per cent preferred stock on the same basis that has prevailed since the stock was first offered. Up to the present time about 61 per cent of the members of the company family are owners of the securities of their company.

Increase in Passengers Carried in Baltimore

The Industrial Bureau of the Board of Trade, Baltimore, has issued a report showing the number of passengers carried by the United Railways & Electric Company, Baltimore, for the first ten months of 1923 as compared with the corresponding period of 1922. The report follows:

	1923	1922
First six months	119,847,962	115,160,811
July	19,701,606	19,653,996
August	19,377,492	19,379,492
September	19,143,158	19,346,983
October	20,586,863	20,360,456
	198,657,081	193,901,738

Interurban Reorganization in Michigan Completed

Reorganization of the interurban system connecting Jackson, Lansing, Battle Creek and Kalamazoo, Mich., has been completed, according to announcement made on Dec. 10 by the reorganization committee. The system was formerly owned by the Michigan United Railways, which went into receivership in December, 1922. Former holders of the bonds of the Michigan United Railways are receiving under the reorganization plan $500 face amount of the bonds of the new company and $600 par value of its Class A preferred stock for each $1,000 face amount of the old bonds. Holders of debentures and preferred stock of the predecessor company are entitled to participate in the issue of Class C preferred stock of the new company.

As has been indicated before in the ELECTRIC RAILWAY JOURNAL, John F. Collins, the Federal receiver, will be operating manager of the Michigan Electric Railway, the successor company.

Auction Sales in New York

At the public auction rooms of A. H. Muller & Sons there were sold on Dec. 12 the following securities:

200 shares of Tennessee Electric Power, second preferred, $47 per share.

$55,000 of Boise & Interurban Railway first mortgage 5 per cent gold bonds, $100 lot.

200 shares Interborough Consolidated, $1 lot.

100 shares Interborough Consolidated Corporation, preferred, $7 lot.

Court Suggests Settlement of Mortgage Liens.—Judge Moynihan in the Circuit Court at Detroit, Mich., has handed down a decision that an allocation of responsibility between the city and Detroit United Railway must take place for the purpose of settling a $5,000,000 mortgage executed by the railway with a number of trust companies Jan. 24, 1922. The mortgage is one of a number of liens on the city lines of the Detroit United Railway when the latter were purchased by the city. Judge Moynihan invited attorneys for the city and the company to come before the court and agree to an equitable solution of the difficulty.

Loss Sustained.—The Dubuque Electric Company, Dubuque, Iowa, in the operation of its traction lines sustained a loss for operations during 1922 and 1923. Although figures show a book profit depreciation, replacement and other costs have not been figured. According to the report, the gross operating revenue in the railway department for the twelve-month period ended Oct. 31 last, was $368,392, with total operating expenses of $357,150.

Receiver Appointed.—Fred Alderman has been named receiver for the Hocking-Sunday Creek Traction Company, Nelsonville, Ohio. Mr. Alderman is an Athens, Ohio, banker.

More Lighting Properties Taken Over by Chicago Interests.—Properties of ten operating Missouri public utility companies in the central part of the state have been acquired by the newly organized Missouri Power & Light Company, Mexico, Mo., the common stock of which is owned by the North American Light & Power Company. The North American Light & Power Company is closely associated with the Illinois Power & Light Corporation in the ownership and management of public utility properties in Illinois, Missouri, Iowa, Kansas, Nebraska and Oklahoma. Another Illinois public utility property, that of the Monmouth Public Service Company, Monmouth, Ill., has been purchased by the Illinois Power & Light Corporation.

Another Hearing on Abandonment.—A further hearing will be held before Commissioner Pooley at Buffalo on Dec. 17 in the matter of the application of the International Railway for approval of a declaration of abandonment of part of its line in Niagara Falls.

Faces New Problem.—A new problem in finance confronts the Boston Elevated Railway. Having taken over the West End Street Railway, which formerly constituted the surface lines as distinct from the elevated lines of the company, it is now trying to fund some of the indebtedness and encounters a peculiar limitation. Under the laws of Massachusetts the Elevated can issue bonds equal to the stock plus the premiums paid into the treasury in connection with the sale of stock; but now it develops that the Elevated cannot issue bonds against the premiums that were paid in connection with the issuance of West End Street Railway stock. In the early days of railway operations in Boston high premiums were paid for both Elevated and West End stock, and if the Elevated today were permitted to take advantage of the West End premiums it could issue new bonds. The Elevated board of public trustees has petitioned the Legislature for legislation to remedy this situation.

Elected to Executive Board.—Travis H. Whitney, the Transit Commission representative on the board of directors of the Brooklyn-Manhattan Transit Corporation, has been elected a member of the corporation's executive committee.

Extra Common Dividend Declared by Canadian Road.—The Ottawa Traction Company, Ottawa, Ont., has declared an extra dividend of 2 per cent in addition to the regular quarterly dividend of 1 per cent, both payable Jan. 2, to stock of record Dec. 15. The stock is all of one class.

Mortgage Gold Bonds Offered. — A syndicate, headed by Harris, Forbes & Company, New York, N. Y., is offering $8,500,000 of the Northern States Power Company first lien and general mortgage gold bonds, known as series A 6 per cent. The bonds are offered at 97½ and interest, yielding about 6.20 per cent. They are dated Nov. 1, 1923 and are due Nov. 1, 1948. Upon completion of the present financing the company will control practically all of the common stock of the Wisconsin-Minnesota Light & Power Company.

Foreclosure Action Against Interurban Averted.—Possible legal action by bondholders against the Oregon Electric Railway, operating in the Willamette Valley in Oregon, whose earnings have been below operating expenses, has again been averted by the announcement of the parent company, the Great Northern and the Northern Pacific, that the semi-annual interest due Nov. 1 on the $2,000,000 of outstanding 5 per cent first mortgage bonds would be paid. The bond interest is $50,000. The deficit for the current year is estimated by W. F. Turner, president of the Spokane, Portland & Seattle Railroad, the holding corporation, at $300,000.

Traffic and Transportation

Startling Station Statistics

More Than 53,000,000 Fares Collected at Times Square Station in New York in One Year

The rapid transit traffic center of New York is for the first time at an uptown point. It has shifted to Times Square from Brooklyn Bridge during the past fiscal year. According to figures compiled by the Transit Commission from the reports of traffic at the various stations on the lines of the Interborough and B.-M. T. systems, the number of rapid transit fares collected at the Times Square stations went ahead of the number at the downtown traffic center by nearly 1,250,000. The figures just compiled are for the fiscal year ended June 30 last.

The fares collected at the Times Square station during the year were 53,835,135, as against 49,036,746 in 1922. At the Brooklyn Bridge center there were 52,613,113 passengers, as against 51,758,609 the year previous. Thus Times Square, with a gain of 4,798,389 passengers, forged ahead of the Brooklyn Bridge center, which gained only 824,504 passengers. The Times Square figures, moreover, include the fare collections only at the stations of the Interborough West Side subway and at the Broadway B.-M. T. stations, while at the Brooklyn Bridge the figures include collections for the Brooklyn elevated lines at the City Hall station of the Second and Third Avenue elevated lines, at the Brooklyn Bridge station of the Interborough East Side subway and at the B.-M. T. terminal beneath the Municipal Building.

Of the fares collected at Times Square, 34,678,063 represented traffic to the Interborough, and 19,157,072 to the B.-M. T. Incidentally, these figures show that these two stations are the largest from the standpoint of passenger traffic upon either of the individual systems. The Interborough traffic represented an increase of 2,711,826, while that on the B.-M. T. showed a gain of 2,086,563. Up to two years ago the traffic on the Interborough at Times Square was practically equal to that at Grand Central Station. While it has grown at the latter point, it has not grown at the rate which marked the increase at Times Square. The great bulk of the B.-M. T. line traffic has been developed in a little less than six years, the B.-M. T. station having been first placed in service on Jan. 5, 1918. The present Times Square station of the Interborough was opened to traffic on Aug. 2, 1918. The fare collections of both systems at Times Square were greater than those upon the entire length of several of the branches of both systems, exceeding for instance, combined totals of stations on the Queensboro subway, the Pelham Bay Park Branch, the Jerome Avenue Branch and the Lenox Branch on the Interborough, and of several of the elevated and subway branches of the Brooklyn system.

Among the important Brooklyn traffic centers, together with the figures of passengers, are the following:

ATLANTIC AVENUE	
I. R. T. Atlantic Ave. Station	15,620,943
B.-M. T. Pacific Street Station	7,555,989
B.-M. T. Atlantic Ave. (Brighton Line) Station	2,050,452
B.-M. T. Atlantic Ave. "L" Station	1,581,205
	26,808,589
FLATBUSH AVENUE—FULTON STREET	
B.-M. T. Dekalb Ave. Station	10,681,184
I. R. T. Nevins St. Station	8,918,708
B.-M. T. Fulton St. Line Station	3,125,835
B.-M. T. Fifth Avenue "L" Line Station	1,496,376
	24,222,103
BOROUGH HALL	
I. R. T. Station	13,467,607
B.-M. T. Court St. Station	4,343,488
B.-M. T. Boerum Pl. "L" Station	1,143,919
B.-M. T. Myrtle Ave.-Court St. "L" Station	964,081
	19,919,095

Of the above stations, Atlantic Avenue gained approximately 641,000 over last year; Flatbush Avenue and Fulton Street about 1,665,000, and Borough Hall about 450,000.

The most important stations, from the standpoint of traffic, on the Interborough system are the following, with the figures of fares collected in both the fiscal years 1922 and 1923:

	1923	1922
Times Square	34,678,063	31,966,237
Grand Central	33,137,199	29,938,128
Penn. Station	27,772,768	25,009,851
14th St. (E. S. subway)	18,430,910	16,966,522
Atlantic Avenue	15,620,943	15,545,431
Brooklyn Bridge	15,162,584	14,984,289
Borough Hall	13,467,607	13,845,912
Fulton St. (E. S. subway)	13,663,465	13,530,045
14th St. (W. S. subway)	11,840,502	10,949,399
86th St. (E. S. subway)	10,516,093	10,266,701

The most important stations on the B.-M. T. subway and elevated lines are as follows:

	1923	1922
Times Square	19,157,072	17,070,509
34th Street	16,434,286	14,723,077
Union Square	15,936,475	14,721,993
Coney Island Terminal	14,908,399	13,868,226
Brooklyn Bridge ("L")	13,886,717	13,908,471
Chambers Street	13,808,395	13,238,249
Essex Street	11,776,459	11,126,708
Cortlandt Street	11,479,474	10,466,274
DeKalb Avenue	10,681,184	9,552,077

The total Interborough subway traffic last year was 676,650,431, a gain of 31,674,957, while the elevated traffic was 348,524,700, a gain of 7,484. The total B.-M. T traffic, which is not segregated as to subway and elevated lines, on account of joint operation, was 480,900,869, a gain of 36,153,641.

Taxpayer Wants Cincinnati Fare Kept to Five Cents

Raising the new point that the Cincinnati Traction Company could not be permitted by the city of Cincinnati to charge more than a 5-cent fare, Attorney Robert S. Alcorn, as a taxpayer, has filed suit in the Hamilton County Superior Court against the traction company seeking to enjoin it from charging the present rate of fare, which is 8 cents, or any fare other than the 5-cent fare stipulated in the enabling act which was passed by the Ohio State Legislature and under which the railway system was leased to the traction company by the Cincinnati Street Railway.

At the time the lease was made the Cincinnati Street Railway had no other authority than was contained in the act, the petition declares, and it further sets up that no other authority different from that contained in the act ever has been procured or enacted by the Ohio Legislature. For this reason, Attorney Alcorn contends the Cincinnati Traction Company now can have no authority to charge more than the maximum fare charged by the Cincinnati Street Railway, its lessor, which was 5 cents for a continuous ride in the same direction.

It is the contention of Attorney Alcorn that, notwithstanding the city ordinances passed by Council under which the Cincinnati Traction Company increased its rate of fare the traction company could receive no authority so to do, because of the fact that such acts by the Council were inconsistent with the enabling legislation by the state, which never has been changed, he avers. Attorney Alcorn asks that the court enjoin collection of more than a 5-cent fare from passengers. City Solicitor Saul Zielonka was asked to bring the suit, but refused, Alcorn says.

Preliminary reports of the Cincinnati Traction Company for the months of October and November indicate the receipts of the company will not equal the amount necessary to meet the various items of the service-at-cost franchise, and that another increase of one-half-cent in fares is in prospect, Jan. 1. This will make the rate of fare 8½ cents. If the increase is determined upon—and that appears probable—official notice of the increase will be posted by the traction company on Dec. 15.

Railway at Youngstown Protests Jitney Licenses

The Youngstown Municipal Railway filed a protest on Dec. 4 with the Public Utilities Commission against the issuing of certificates under the new motor bus law to sixty Youngstown operators of "jitneys" who have made application for authority to operate. The applications are set for hearing Dec. 12.

Ross Raymond, head of the jitney men, filed the applications in Columbus. He is to file other applications within a few days that will bring the number of jitneys licensed by the State to operate in Youngstown above the 100 mark, if the applications are granted.

The commission recently refused to grant Mr. Raymond a blanket franchise for all the jitneys and instructed him to make separate application for each.

The ordinance prohibiting jitneys from entering the congested district was passed by City Council of Youngstown Dec. 3 as an emergency measure.

Councilman Parrock fathered the ordinance at the request of Street Railway Commissioner Engle, who said that the "jitneys must go if the street railway is to exist."

The ordinance provides for a fine of not less than $5 or more than $10 for the first conviction and from $10 to $25 for subsequent convictions.

Allentown Employees Give Advice to Auto Driver and Owner

The Lehigh Valley Transit Company, Allentown, Pa., through its general safety committee is carrying on a campaign for the reduction of accidents between automobiles and its cars. The general safety committee called on patrons who owned and drove automobiles and talked to citizens relative to highway accidents in order that cooperation could be had between the drivers of automobiles and the trainmen of the transit company. This committee is composed of motormen and conductors of the Lehigh Valley Transit Company, who have compiled a few thoughts which they have printed in pamphlet form and are distributing to auto owners and drivers. The pamphlet gives in detail statistics of grade crossing accidents and general news of automobile accidents. It warns against careless driving especially in the coming holiday season. The pamphlet states that the committee is trying to do its part and is urging Mr. Auto Owner and Auto Driver to do their part. In the opinion of the committee 99 per cent of all accidents could be eliminated by respect for the rights of others and strict observance of road rules.

Another Employer in New York Staggers Hours

In an attempt to "stagger the peak" of subway traffic congestion, the Brooklyn Edison Company announced on Dec. 11 that it had reorganized the schedule of 1,000 employees in the office of its auditing department at the main office in Pearl Street, Brooklyn, so that they would arrive at work at 8:30 and 8:45 a.m. instead of 9 o'clock. If the system shows beneficial results it will be extended to all the 6,000 employees of the company. This is the third instance of a large business organization in New York City following the recommendation of the Transit Commission for improving transit traffic conditions pending the construction of new subways. The others are the Texas Company and Corn Products Refining Company.

Special Christmas Shoppers' Service Put On by Chicago Elevated

Special express service throughout the day for the convenience of Christmas shoppers was started on all of the divisions of the Chicago Elevated Railroads early in December. This service is designed to encourage use of the elevated during the shopping period and is made particularly convenient by operating these trains around the loop structure which embraces the heart of the shopping district.

Time-tables announcing the new service have been distributed at all elevated stations and have stimulated travel during the non-rush periods. The "Shoppers' Specials" are scheduled from 9:18 a.m. to 4:13 inbound and 9.55 to 4.50 outbound. They carry conspicuous signs at the front ends of the trains. On the backs of the time cards is printed an announcement of the new service and a list of the benefits to be derived by the public.

Safety Order Effective. — Accepting the proposition made voluntarily by the Rockford & Interurban Railway, designed as a safety measure to protect auto traffic at dangerous crossings, the Wisconsin Railroad Commission will enter an order effective at once requiring all interurban cars running between Beloit and Janesville to slow down to 5 miles an hour within 100 ft. of the town line bridge and after sundown to stop at points where the tracks cross the adjoining concrete highway.

Fares Increased. — The Mississippi Valley Electric Company operating in Iowa City with both trolley and buses, recently increased its fare from 5 cents to 7 cents, according to J. O. Schulze, president. No opposition to the increase was entered by the city or by citizens.

More Truck Lines for D. U. R.—The Detroit United Railway has organized the Detroit United Railway Trucking Company to operate between Jackson and Sturgis, Mich. The truck line will serve as a feeder for the electric lines, connecting with them at Jackson. It will afford freight service to and from Detroit to a territory which has hitherto been difficult to reach.

Will Hear Increased Fare Request.—The State Railroad Commission of Florida, will hear in the City Council chamber of Jacksonville, on Dec. 17 the petition of the Jacksonville Traction Company for an increase in fares. The company now charges 7 cents for fares in the city, with concessions to school children. It does not ask for any fixed increase.

Additional Parlor Train Car in Service. — The Milwaukee Northern Railway placed in service recently an additional parlor train car between Sheboygan and Milwaukee, which is known as the "Sheboygan Limited." It will be a sister car to the one that is now running as the "Lake Shore Limited."

Fare Bills Appear at Washington.—Bills have again begun to appear in Congress directed against the local railways operating in the District of Columbia. A bill by Mr. McKellar, referred to the committee on the District of Columbia, would prohibit the local Public Utilities Commission from fixing rates of fare for the street railways of the District in excess of those that are stipulated in their charters. A bill introduced in the House would provide one-half fare for children riding on the street railways within the District of Columbia, "and for other purposes."

Veiled Prophet Brings Business.—All previous records for the United Railways, St. Louis, were broken on Oct. 2, the day of the visit of the Veiled Prophet to that city, when 1,007,615 revenue passengers were hauled, and the receipts totaled $70,533. In addition there was 869 children's fares and 473,674 transfer passengers, the grand total being 1,482,158 passengers. A total of 1,465 cars was in service, twenty-eight more than were put into service on a similar occasion last year. There were no serious accidents on the record day. The previous record was set on Oct. 5, 1920, when the gross receipts were $69,595. On that occasion a visit of the Veiled Prophet again brought out the record business.

Will Readjust Zones. — Despite the fact that the Virginia State Corporation Commission granted it permission to increase its revenue by 5 per cent on the Richmond-Petersburg Interurban line, General Manager John E. Harvell of the Richmond division of the Virginia Railway & Power Company stated recently that no increase in fares would go into effect, but that a readjustment of zones would be substituted. He said that in accordance with the orders of the commission the company would arrange to correct what the commission considered inequalities in the fare zones by making the mileage of the respective zones more uniform. Further, he stated that the company would simplify its commutation tickets by issuing only one form or one fifty-trip book. Heretofore the company issued four different kinds of tickets, and five different kinds of books. The changes go into effect Dec. 16.

Eight-Cent Fare Continued. — The Nebraska State Railway Commission has continued indefinitely the 8-cent fare on the lines of the Lincoln Traction Company and fixed a valuation of $2,824,000 for the company's property. The valuation is about $100,000 less than the total outstanding capitalization of the company.

Another Aid to Safety.—The Portland Railway, Light & Power Company, Portland, Ore., has placed safety islands, made of strong timbers, at various points along congested street railway lines, with the view of lessening traffic congestion at these points, and adding to the safety of the patrons of the lines it operates.

Personal Items

Barron Collier Subject of Magazine Sketch

Barron Collier is the subject of a personal sketch in a recent issue of the *National Magazine* which brings out forcefully the multifarious activities of the man. The work of Mr. Collier in the railway field is too well known to need reiteration here. Except to his intimates, however, it appears unlikely that all the various activities and interests of the man are known. Mr. Collier was born in Memphis, Tenn., in 1873, and there laid the foundation for the present nationally known Collier service. Some pertinent quotations from the article follow:

"One of the most graphic, dynamic charts of the business of the United States is the great panoramic display in the street cars containing the Collier advertisements. These cars run night and day. Think of it, 50,000 cars—and there are some advertisers who appear in these cars continuously.

"Barron Collier sees things quickly and acts decisively and works as hard in public service, without salary, as in his own business.

"A small list of his activities today would cover a page or two of 'Who's Who.'

"Mr. Collier owns, among other great properties, famous Luna Park, the most original place of amusement in the world.

"American to the core, he has been pointed out as a true type of one of the eminently successful men in this great age of business expansion primarily through the magic of advertising.

"The genius of Barron Collier as an executive is reflected in his talents as a toastmaster and entertainer.

"It is recognized, even in the swirl of busy activities in New York, that Barron Collier is about the busiest man in the metropolis. He seems to have a masterful grasp of what to do today to make things go on tomorrow."

In conclusion the writer says that all the multifarious Collier activities keep right on moving and developing under the magic and forceful leadership of Mr. Collier, who, after all is said and done, "is just a great, big human, full of the spirit of constructive helpfulness for his fellowmen."

C. A. Brooks Manager Again in Poughkeepsie

Charles A. Brooks has again been made manager of the Poughkeepsie City & Wappingers Falls Electric Railway, Poughkeepsie, N. Y., from which position he resigned about a year ago to go into the automobile business. He succeeds the late R. J. Morrisson. Mr. Brooks is well acquainted in the territory served by the company with which he has again become identified. It was a little more than ten years ago that he entered its employ. Prior to that time he had been engaged in similar activity with the Third Avenue Railway, the South Shore Traction Company and on properties in the Central West.

F. R. Phillips Heads Pennsylvania Association

Official of Pittsburgh Railways Elected President at Meeting in Harrisburg on Dec. 4

F. R. Phillips, acting general manager of the Pittsburgh Railways, was elected president of the Pennsylvania Street Railway Association at the meeting held in Harrisburg on Dec. 4. Mr. Phillips was formerly superintendent of equipment of the Pittsburgh Railways. This position he held from 1910 until July, 1923, when he was appointed to succeed the late P. N. Jones. Before going to Pittsburgh Mr. Phillips was master mechanic of the Cleveland Railway. He entered the employ of that company in 1894 after leaving high school in Cleveland. When the Cleveland City Railway and the Cleveland Electric Railway were consolidated in 1903 as the Cleveland Electric Railway Mr. Phillips accepted the position of master mechanic of the Cincinnati, Newport & Covington Railway. Subsequently, he became chief engineer in charge of all but the transportation department of the Michigan United Railway, in Lansing. In 1906 Mr. Phillips entered the employ of the Ohio Brass Company, Mansfield, as designing engineer in charge of railway overhead work, and made a study for that company of the electric railway conditions of most of the large cities of the United States east of the Mississippi River. In July, 1908 he became master mechanic of the Cleveland Traction Company, in charge of buildings, shops and equipment. Mr. Phillips is the inventor of a number of railway devices and has appeared before several railway commissions as an expert.

F. R. Phillips

Mr. Phillips has been very active in the activities of the American Electric Railway Engineering Association, serving not only as a member of committees but as chairman of important committees. From 1916 to 1919 he was president of the Engineering Association. During 1922-1923 he served as a member of the committee on standards and also as a member of the special committee to study methods of voting on standards on the unit basis.

Obituary

Sir William Mackenzie

Sir William Mackenzie, one of Canada's empire builders, died in Toronto on Dec. 5. Sir William's name is inseparably linked with the building of both the Canadian Pacific and the Canadian Northern Railroads. He was one of the foremost Canadian promoters of electric railway, light and power companies. For thirty years he was head of the Toronto Railway.

He was also one of the promoters of utility enterprises in South America and had a large interest in the Brazilian Traction, Light & Power Company, which operates the tramway and power properties at São Paulo and Rio de Janeiro. Sir William was also interested in the Winnipeg Electric Railway and was a director of the Shawinigan Water & Power Company and the Canadian General Electric Company. He was president of the Monterey (Mexico) Railway, Light & Power Company for years. He was the senior partner of the well-known building firm of Mackenzie & Mann. With the changes wrought by the war Sir William was forced, as he grew older, to drop many of his responsibilities and the chief enterprises in Canada with which he had been concerned passed to others and the group of so-called Mackenzie financiers was dissolved. Sir William was born in Kirkfield, Ont., in 1849.

William V. Brumby, head of the publicity department of the United Railways, St. Louis, Mo., died in St. Louis, of pneumonia, on Dec. 7. As head of the publicity department of the railway for the last six years, Mr. Brumby was editor of the *United Railways Bulletin* and also *Trolleygrams,* published periodically by the company, to keep its patrons advised of company activities, etc. For a time he was also editor of *Know St. Louis,* a weekly journal dedicated to boosting St. Louis. Prior to his connection with the United Railways, Mr. Brumby was city editor of the St. Louis *Republic* and later was managing editor of the St. Louis *Star.* He was born in Atlanta, Ga., forty-seven years ago and had resided in St. Louis about sixteen years. He was one of St. Louis' best known newspaper men.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Reconstruction in Japan

Rolling Stock in Tokio Is Being Replaced Rapidly by the Local Car Builders

Although no accurate statistical figures are yet available concerning the extent of the damage done by the recent earthquake to the Japanese railways the report of American engineers who were in the country at that time gives a rough idea of the resulting destruction. In the municipality of Tokio there were formerly about 2,500 electric railway cars. The rolling stock was being added to at the rate of approximately 200 cars a year, of which two-thirds were double-truck cars and one-third single truck. It is said that upwards of 1,000 cars were destroyed by the earthquake and the fire which followed it. Orders have already been placed for 500 new cars to replace those demolished. It is understood that these orders have been given to Japanese firms who will build the equipment in Japan. Only the air-brake material is being purchased in the United States, and the car bodies, trucks, motors, etc., all will be made in Japan.

In the Yokohama district even less is known concerning the extent of the damage and subsequent plans for replacement. It is likely, however, that practically all of the rolling stock was destroyed.

ELECTRIFICATION WORK WILL PROBABLY CONTINUE

A great deal of damage was also done to the Imperial Government Railway and its substations. Orders for the replacement of much of this material have already been given and described on these pages in the previous issues. It is expected that no change will be made on account of the catastrophe in the plans to continue the electrification work.

Just what effect the earthquake will have on plans for subway construction in Tokio is problematical. Before the calamity occurred, three companies had been organized to build subways in that district. Plans for financing this work had been almost completed and actual construction would probably have commenced within a short time. The earthquake, however, has focussed a great deal of engineering attention on the comparative merits of various types of construction in Japan. It seems doubtful whether the subway plans will be carried out until a careful study has been made to show how different structural designs withstand such shocks. If it is found that the usual methods of subway construction are unsuitable for conditions in Japan and that more expensive methods will have to be employed it may cause the curtailment or even the abandonment of the project.

Satisfactory Year for General Electric Predicted

According to latest available estimates, the General Electric Company at the end of the current year will have finished one of the most satisfactory years in its history with production at top speed and orders near to a record rate. The company should show at the end of the current year new orders booked well over $300,000,000 and goods billed of about $270,000,000. For the first half of the year new business reached the record volume of $164,000,000, easily exceeding production. Subsequent orders declined some 20 per cent, but of late an upward trend has taken place. More than $90,000,000 in unfilled orders will be carried into 1924 as compared with $76,000,000 this year. Working capital will be somewhat reduced compared with the approximate $180,000,000 at the close of 1922. Cash and government securities should amount to around $80,000,000 at the end of 1923, a reduction of $5,000,000 being explained by increased business and new plant construction. It is generally expected that the company's business will hold up at about the same level as this year. No recent large orders for railroad electrification have been placed, but several important railroads are contemplating electrification.

Price of Bituminous Coal Is Steady

No marked change has occurred in the price of bituminous coal at the mine during the past eight weeks. During this time the cost per ton has ranged between $2.20 and $2.25. Prior to that there was a steady decrease in price from an average of $3.66 per ton during the first quarter of the year to $2.66 for the second quarter and $2.41 for the third quarter.

The present price level is below that of any recent year. In 1922 the average for the first three months was $2.18 per ton but thereafter the price level was much higher, reaching the maximum of $5.35 during the third quarter. In 1921 the price ranged between $2.89 in the early part of the year and $2.31 in the latter part of the year. The average price for the year 1920 was $5.64 and for the year 1919 it was $2.59. It is interesting to compare the present price of $2.25 per ton with that of 1913, when bituminous coal at the mine cost $1.23.

Railways Are Buying Larger Trolley Wire

A somewhat general tendency to use trolley wire of larger diameter has been noticed by the Bridgeport Brass Company in its recent orders from electric railways. In the past the No. 00 size has been the wire in greatest demand, although the No. 0000 size has been used to some extent by the street railway systems in the larger cities, and the No. 0 wire has been in some demand for the smaller properties. Lately, however, the number of orders for No. 000 wire has shown a marked increase. The smaller sizes are still being bought for replacement work where such sizes are the standard and for lines where the traffic is very light. But for ordinary conditions of city service many railways seem now to require the larger sizes.

U. S. Economic Prosperity Certain

Analyzing the situation in the United States in regard to its susceptibility to the influence of European misfortunes, it would seem that this country is so strongly buttressed by its natural advantages and so largely self-contained as an economic and financial unit that it is likely to be comparatively immune from the serious conditions in other countries. This is the opinion of F. H. Sisson, vice-president of the Guaranty Trust Company, delivered in an address on the economic outlook in Europe before the Economic Club of New York. In referring to the United States foreign trade, which has the most direct interest, he said that when the markets in Great Britain and on the Continent were in normal activity they absorbed between 60 to 70 per cent of American exports. In comparison with pre-war averages of exports to Europe the volume of the present trade is not diminished, while the value has increased materially. Considering the extremely adverse conditions that have existed these facts indicate that the United States is likely to retain a fairly satisfactory volume of trade with the Continent. It was his belief that American economic stability was a fact. To emphasize this he pointed to the almost unlimited production of raw materials, food and manufactures.

Metal, Coal and Material Prices

Metals—New York	Dec. 11, 1923
Copper, electrolytic, cents per lb.	13.15
Copper wire base, cents per lb.	15.75
Lead, cents per lb.	7.25
Zinc, cents per lb.	6.61
Tin, Straits, cents per lb.	46.375
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.50
Somerset mine run, Boston, net tons	2.125
Pittsburgh mine run, Pittsburgh, net tons	2.05
Franklin, Ill., screenings, Chicago, net tons	1.70
Central, Ill., screenings, Chicago, net tons	1.45
Kansas screenings, Kansas City, net tons	2.08
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$6.65
Weatherproof wire base, N. Y., cents per lb.	17.00
Cement, Chicago net prices, without bags	$2.10
Linseed oil (5-bbl. lots), N. Y., per gal.	$0.94
White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots	11.25
Turpentine, (bbl. lots), N. Y., per gal.	$0.93

Rolling Stock

Cleveland, Southwestern & Columbus Railway's twelve new lightweight interurban cars are equipped with four General Electric No. 265 35-hp. motors and single-end K-35 control with straight airbrake equipment and CP-27 compressors. The purchase was referred to in the ELECTRIC RAILWAY JOURNAL, issue of Nov. 17.

General Electric Company, Schenectady, N. Y., has announced some of the details of the order received by it from the city of Detroit for 100 four-motor car equipments for use in new cars to be operated by the Municipal Railways of that city. They will be installed on Peter Witt double-truck type cars, duplicates of 250 such cars now in use. The order calls for No. 265 motors with K-35 single-end control and CP-27 compressors. Fifty complete air brake equipments were also ordered.

Morris County Traction Company, Morristown, N. J., suffered the loss of a car shed at Dover on Dec. 9 as the result of a fire which destroyed the building, two safety cars, two 400 class steel cars and three 310 class semi-convertible. One steel car and one snow sweeper were slightly damaged. There was also some damage done to the sand drying house. A storeroom containing a part of the regular supplies was also destroyed. The total loss of the building and supplies amounted to approximately $65.000, largely covered by insurance. Full service on the entire line was restored within three hours after the fire. No plans for replacement have been discussed.

Montreal & Southern Counties Railway, Montreal, Canada, ordered during 1923 one trailer for suburban use and one baggage car from the Ottawa Car Company.

Track and Line

Durham Public Service Company, Durham, N. C., during 1923 rebuilt 2,100 ft. of single track.

Lafayette Street Railway during 1923 built 1,500 ft. of track extension and rebuilt 832 ft.

Aurora, Elgin & Chicago Railroad, Fox River Division, rebuilt during 1923 3 miles of city track and 4½ miles of interurban track.

Cincinnati Traction Company during 1923 built 5,764 ft. of track extension and rebuilt 24,254 ft.

El Paso Electric Railway, El Paso, Tex., will complete shortly the laying of new steel on the Sheldon "loop." The new steel cost $70 a ton for ordinary and $300 to $400 a ton for special work. About $19,000 was spent on special work steel.

Clinton, Davenport & Muscatine Railway, Davenport, Iowa, has received authority to lay a service track over the combined tracks and right-of-way of the Burlington, Milwaukee and Davenport, Rock Island & Northwestern Railroads east of Davenport in order to ship in materials for the new $12,000,000 superpower plant which the United Light & Railways company is erecting at that point. The Clinton, Davenport & Muscatine Railway is a subsidiary of the United Light.

Iowa City Electric Railway, Iowa City, Iowa, is making an extension on its North Dodge Street line.

Manitowoc & Northern Traction Company, Green Bay, Wis., during 1923 laid 1,110 ft. of new rail.

Eastern Wisconsin Electric Company, Oshkosh, Wis., has completed track repair and improvement work to the southern end of the north and south divisions of its system in Sheboygan.

Des Moines City Railway will be able to put into operation before Christmas the new Crocker Street line as far as Thirty-third Street.

New York, N. Y.,—The Transit Commission has announced that a public hearing will be held on Dec. 21 at its office upon the draft form of contract for the construction of the crosstown subway. Plans are now practically completed for the section extending under Bedford Avenue from DeKalb Avenue to Keep Street. Commissioner Harkness stated that unless substantial changes were needed in the contract, the advertising for bids for this section should promptly follow the holding of the public hearing which is required by the rapid transit act. The advertisement for bids might be looked for possibly the latter part of this month, but surely the first part of January.

Power Houses, Shops and Buildings

Los Angeles Railway recently completed its Fifty-fourth Street substation building. It was built at a cost of approximately $21,000, and will house machinery to improve the power facilities in the southwest section of the city.

Ottawa Electric Railway, Ottawa, Canada, is constructing a building adjoining its Albert Street carhouse which will contain a modern substation. The building will be 200 ft. long and 35 ft. wide. It will be of reinforced concrete, steel and brick construction and fireproof throughout. A Westinghouse commutating pole synchronous rotary converter of 2,000-kva. capacity, six-phase alternating current, 600 volts direct current will be installed in the substation next month. This is one of the largest of its type in Canada. The 600 volts direct current will be carried in underground conduits in lead cable to the overhead trolley and feeder circuits and rail returns. The garage will be used for the storage of the company's motor cars and trucks and will also contain the linemen's quarters as well as workshop and stores for the line department.

Pacific Electric Railway, Los Angeles, announces work is to commence at once on two additional automatic substations to take care of increased traffic on its Long Beach, Newport Beach, Hollywood and Glendale lines, involving an estimated expenditure of $245,000. The substation to take care of increased traffic on the company's Hollywood and Glendale lines will be erected at Second and Toluca Streets, Los Angeles, and will provide the increased power requirements for 100 new cars soon to be placed in service on the company's Hollywood lines. The second automatic substation is to be erected at North Long Beach, where traffic has rapidly increased due to the development of the Long Beach industrial district. During the past year more than $800 000 has been expended by the company for increased power facilities.

Trade Note

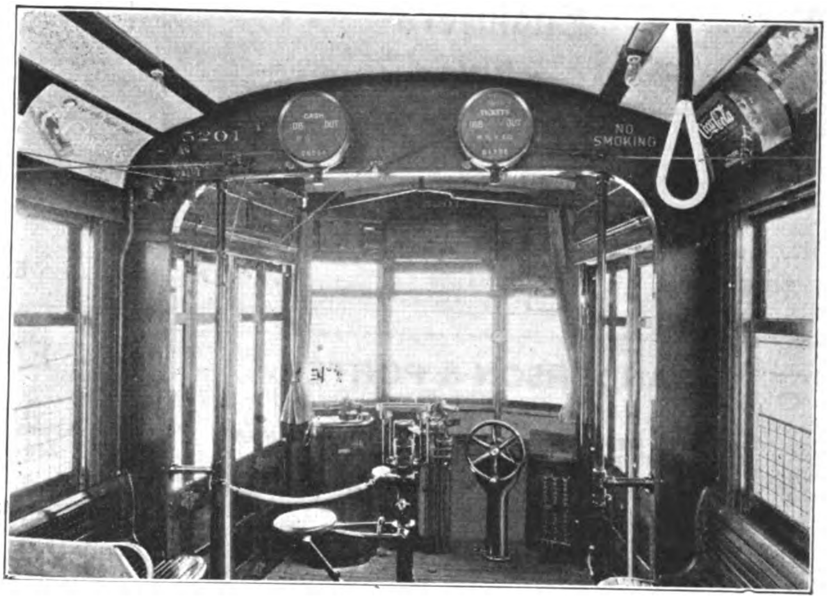
Pantasote Company, Inc., New York, N. Y., has been changed from a partnership to a corporation. It is now known as the Pantasote Company, Inc.

New Advertising Literature

Westinghouse Electric & Manufacturing Company, East Pittsburgh, has issued three descriptive leaflets dealing with railway motors and electric locomotives. Leaflet Number 20,124 gives specifications for the Class B-1 50-ton locomotive, including ratings of hourly continuous and maximum capacity. The particular application of the locomotive is described and the details of its construction are enumerated. Leaflet Number 20,125 contains specifications for the No. 562 railway motor. It gives hourly and continuous capacity ratings, as well as a descriptive paragraph of the application of the motor and a table indicating the performance of a 50-ton locomotive equipped with four of these motors. The third, Leaflet Number 20,047, gives specifications for the Number 557 railway motor. This contains essentially the same information regarding the No. 557 motor as leaflet No. 20,125 regarding the No. 562 motor. The only difference is that the table on the first page of this publication is one to determine the suitability of the motor for a desired schedule.

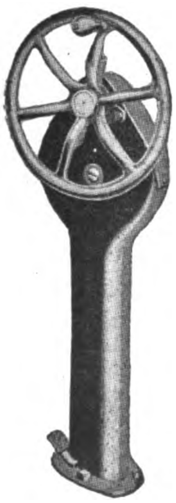
Oakite Chemical Company, New York, N. Y., in its November-December issue of "News Service" has some interesting information with illustrations on how to clean cars. The company has also available a new sixteen-page booklet, entitled "Cleaning in Railroad and Car Shops," which will no doubt be of use to railway executives.

PEACOCK



Notice the Peacock Staffless Brakes

on the modern double-truck cars!


The Peacock Staffless

Chosen because they are lighter, occupy least platform space and require little or no maintenance. These reasons are all strong ones! But even stronger is this final clincher — Peacock Staffless Brakes possess a braking power which will even lock the wheels; and sufficient chain-winding capacity to overcome any possible condition of slack-rigging or worn brake shoes.

Especially suitable for the medium-weight one-man, two-man, double-truck car.

National Brake Company, Inc.
890 Ellicott Sq. Buffalo, N. Y.
Canadian Representative:
Lyman Tube & Supply Company, Limited, Montreal, Canada

BRAKES

[illegible]

Ford, Bacon & Davis
Incorporated
Engineers
115 Broadway, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

STONE & WEBSTER
Incorporated
EXAMINATIONS REPORTS APPRAISALS
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NEW YORK BOSTON CHICAGO

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REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS
RAILWAY, LIGHT and POWER PROPERTIES
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ELECTRICAL—CIVIL—MECHANICAL
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Appraisals, Reports, Rates, Service Investigation,
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WALTER JACKSON
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DAY & ZIMMERMANN, INC.
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Design, Construction
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Consulting Engineers
Specializing in Utility Rate Cases and
Reports to Bankers and Investors
1017 Olive St., St. Louis, Mo.

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Engineers
149 BROADWAY 424 CHESTNUT STREET
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AMERICAN BRIDGE COMPANY
EMPIRE BUILDING, 71 BROADWAY, NEW YORK

Manufacturers of Steel Structures of all classes, particularly
BRIDGES AND BUILDINGS

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Detroit, Mich. . . Beecher Ave. and M. C. R. R.
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J. ROWLAND BIBBINS
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TRANSPORTATION
Complete Transit Surveys and Development Programs, adapting Motor-Transport, R.R. Terminal and City Plans. Traffic, Service, Routing, Operation and Valuation. EXPERIENCE IN 20 CITIES

The Most Successful Men in the Electric Railway Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

JOE R. ONG
Consulting Transportation Engineer
Specializing in Traffic Problems and in Methods to Improve Service and Increase Efficiency of Operation
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EDWIN WORTHAM, E.E.
Consulting Engineer
Valuations of Electric Railways and Utilities of All Kinds
Traffic and Operating Studies
Allison Bldg. **Richmond, Va.**
Established Feb. 1913.

THE P. EDWARD WISH SERVICE
50 Church St.
NEW YORK
Street Railway Inspection
DETECTIVES
131 State St.
BOSTON

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

A. L. DRUM & COMPANY
Consulting and Constructing Engineers
VALUATION AND FINANCIAL REPORTS
RATE STUDIES FOR PRESENTATION TO PUBLIC SERVICE COMMISSIONS
CONSTRUCTION AND MANAGEMENT OF ELECTRIC RAILWAYS
230 South Clark Street
Chicago, Ill.
215 South Broad Street
Philadelphia, Pa.

The Value of the Statistical Number

The following is an excerpt from the record in a recent court proceeding:

Q. Have you some figures taken from the ELECTRIC RAILWAY JOURNAL?

A. I have.

Q. What is the ELECTRIC RAILWAY JOURNAL?

***A.* It is a publication generally recognized as an authority on street railway operation.**

Q. Have you the figures shown by the ELECTRIC RAILWAY JOURNAL of the cars ordered by city railways within the United States during the eleven years past?

A. I have.

Q. How many cars have been ordered during the past eleven years in the United States?

A. 28,417.

Q. Of that number, how many were open cars?

A. 342.

Q. Have there been any open cars ordered within the United States, according to the articles of the ELECTRIC RAILWAY JOURNAL, since 1916?

A. No.

Q. In 1916 how many cars were ordered?

A. 3,046.

Q. How many of these were open cars?

A. 131 were open cars, or 4.31 per cent.

Q. As you state, no open cars have been ordered since 1916. Is that correct?

A. That is correct.

Q. What was the total number of cars ordered in 1917?

A. 1,998.

Q. In 1918?

A. 1,842.

Q. In 1919?

A. 2,129.

Q. And the following year?

A. 2,889.

Q. And in 1921?

A. 1,059. I might add that these figures cover cars for city service only.

Tie-up with this!

Testimony, like that reprinted at the left, indicates the reliance placed on the Statistical Issue of ELECTRIC RAILWAY JOURNAL.

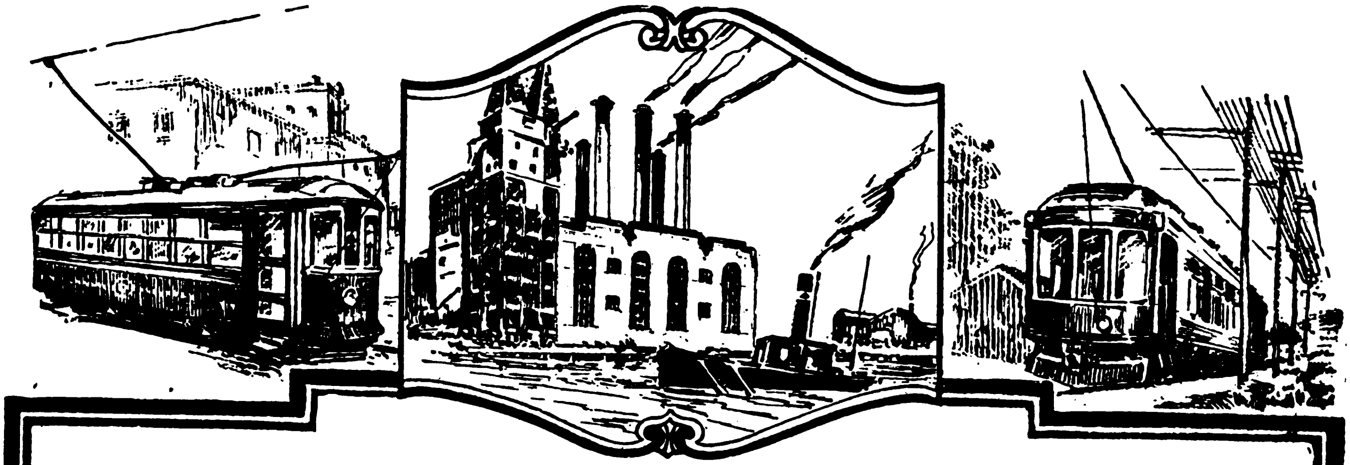
We repeat—the Annual Statistical Issue is depended upon — used — re-used and kept for reference.

Your advertisement in such a medium will command attention.

Our Service Department will gladly co-operate in the preparation of appropriate and effective advertising copy without charge. Space rates on request.

JANUARY 5, 1924
ELECTRIC RAILWAY JOURNAL
The Annual Statistical and Review Number

ELECTRIC RAILWAY JOURNAL
Tenth Avenue at Thirty-sixth Street, New York



THE TEXAS COMPANY U.S.A. PETROLEUM PRODUCTS

TEXACO

Do You Know What a TRADE-MARK is for?

Possibly you think a trade-mark is put on goods to protect the manufacturer, so that no competitor can imitate his product.

That's only partly true.

The real purpose of a trade-mark is to indicate the origin of the goods so that the public can be protected.

In other words, a buyer, once having bought a trade-marked article, will know later on, at future purchases whether to seek or to avoid products bearing the mark in question.

So, then, a trade-mark should protect the buyer.

The Texaco Trade-Mark does protect the buyer of lubricants.

Every barrel, every can of oil or grease bearing the Texaco Red Star, Green "T" is manufactured at The Texas Company's refineries and is backed up by a positive assurance of uniformity and efficiency.

The more you think of this, the more it will mean to you.

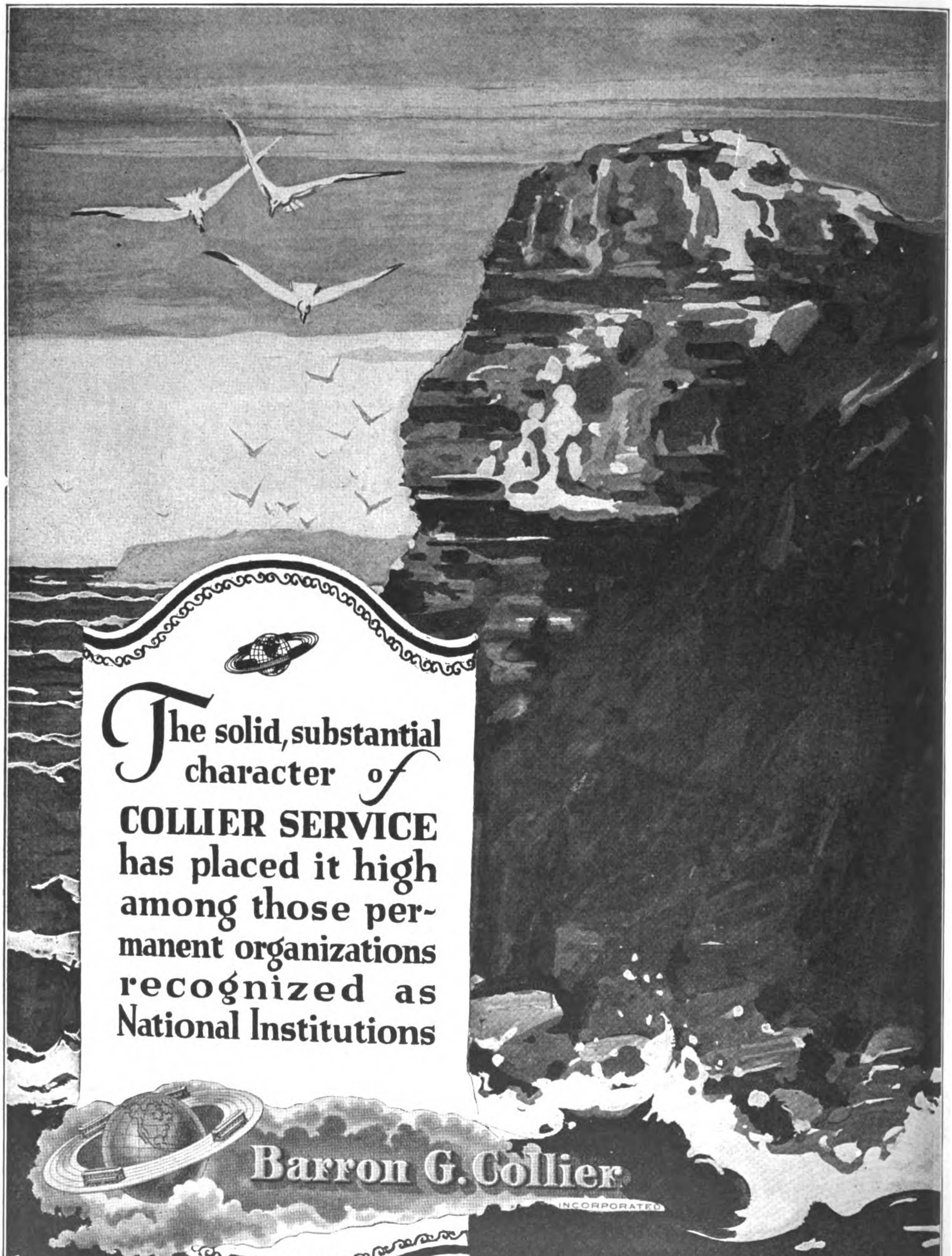
It means no "picking up" of oils and greases and then branding them with the name of the company who "sells" them—but does not always "make" them.

On the contrary, we repeat, every barrel with the Texaco trade-mark contains oil and grease made and handled from the Crude Product to Delivery exclusively—by TEXACO.

Hence, a Texaco guarantee is a real guarantee.

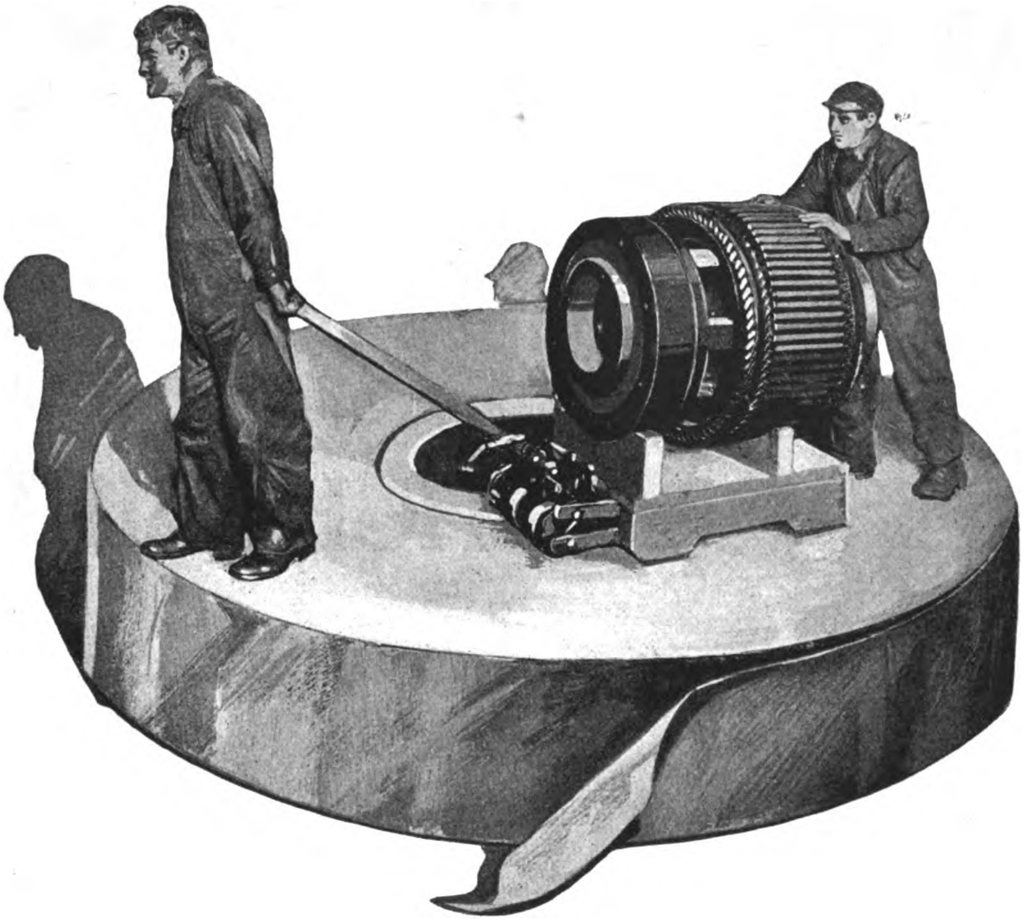
There is a Texaco Lubricant for Every Purpose

TEXACO TEXACO



The solid, substantial character of COLLIER SERVICE has placed it high among those permanent organizations recognized as National Institutions

Barron G. Collier
INCORPORATED



Putting Insulation Requirements on a Firm Foundation

It is not enough for a motor manufacturer or an industrial plant to standardize on one kind of varnished insulation simply because he buys it from the largest manufacturer of that product such as "Irvington."

It is not enough that today the majority of high tension insulated wires and cables in the United States are protected by Irvington Black Varnished Cambric.

But when we say that in comparison with yellow varnished cambric, Irvington Black Varnished Cambric has 30% higher dielectric strength; 100% better heat resistance; 100% more alkali and acid resistance; 200% better aging qualities; 200% more resistance to oil, no further explanation of the foregoing facts is necessary.

Like many other manufacturers, you can build on a firm foundation, by standardizing on Irvington Black Varnished Cambric Tape.

IRVINGTON VARNISH & INSULATOR CO.
Irvington, New Jersey.
Established 1905

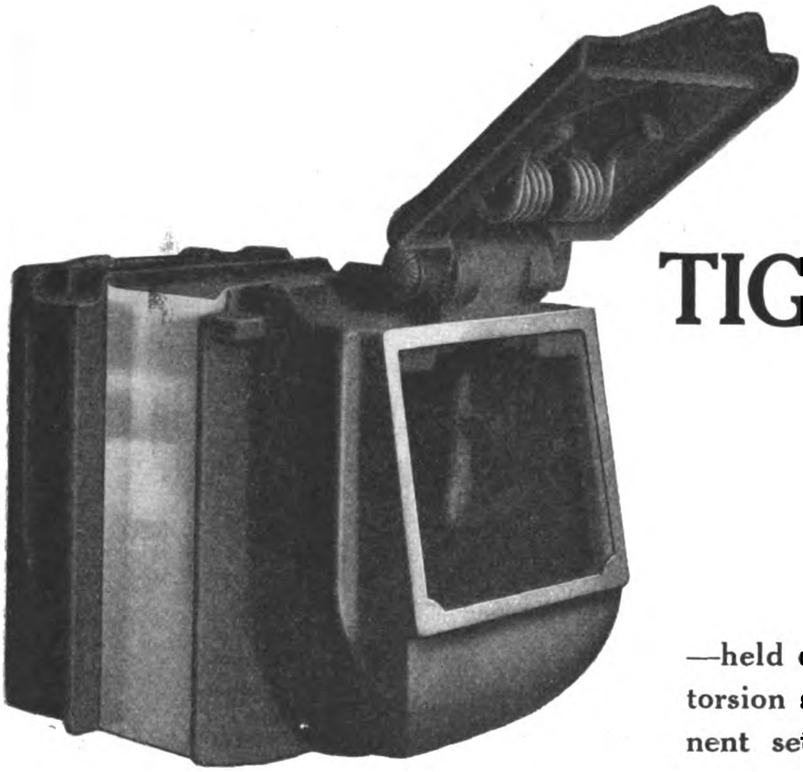
Sales Representatives:

Mitchell-Rand Mfg. Co., New York
T. C. White Electrical Supply Co., St. Louis
E. M. Wolcott, Rochester
F. G. Scofield, Toronto
L. L. Fleig & Co., Chicago
Consumers Rubber Co., Cleveland
Clapp & Lamoree, Los Angeles and San Francisco

Seven Factors of Quality

High Dielectric Strength
High Resistance
Flexibility
Non Hygroscopic
Heat Resisting
Chemically Neutral
Maximum Elasticity

JOURNAL BOXES



WITH TIGHT FITTING LIDS

—held closed against a milled seat by a torsion spring that cannot take a permanent set or lose its holding power in service.

—permanently secured to the journal box with a riveted hinge pin.

That is how Symington Semi-Steel Journal Boxes protect journals and journal bearings from dust and grit.

This protection increases the effectiveness of lubrication and prolongs axle and bearing life.

THE T. H. SYMINGTON CO.
New York Chicago Baltimore
Boston Montreal
WORKS: ROCHESTER, N. Y.

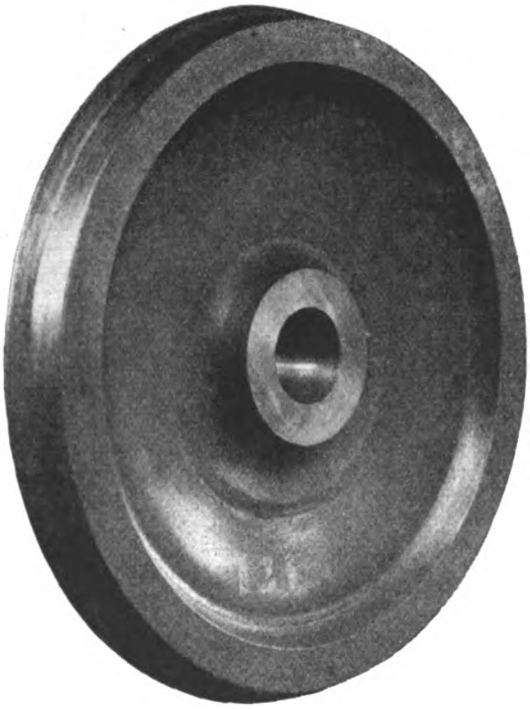
SYMINGTON

PANTASOTE
TRADE MARK
AGASOTE
TRADE MARK

*Standard for
Electric Railways*

THE PANTASOTE COMPANY, INC.
11 Broadway, New York
Peoples Gas Building, Chicago
Monadnock Building, San Francisco

‘CARNEGIE’



—the name
that guarantees
Service
to users
of Wheels

‘The Proof is in the Wearing’

Carnegie Steel Company
GENERAL OFFICES: CARNEGIE BUILDING 434 FIFTH AVENUE PITTSBURGH, PA.

1661

BUYING
as affected by
SELLING

IT IS to your interest to know that goods are *well sold,* as well as well made. You have to pay the cost of selling just as you have to pay for the cost of manufacturing. Think it over.

And the cost of selling is no small item. In some cases it costs more to sell goods than to make them. The seller who clings to antiquated, expensive methods of selling is no more entitled to your patronage than the one who runs an out-of-date factory, because *you have to pay* the additional costs in either case.

If the waste is to be squeezed out of selling, the buyer cannot escape a share of the responsibility in bringing it about.

THIS means recognizing the efforts of those sellers who have adopted modern, economical methods of selling, and one of these beyond any question is good advertising in good Business Papers.

Advertising not only cuts the cost of selling, but it increases production volume and lowers manufacturing costs. It standardizes quality, and is a guarantee of good faith.

You are invited to consult us freely about Business Papers or Business Paper Advertising

LIST *of* MEMBERS

Each has subscribed to and is maintaining the highest standards of practice in its editorial and advertising service.

Advertising and Selling
American Architect & Architectural Review
American Blacksmith, Auto & Tractor Shop
American Exporter
American Funeral Director
American Hatter
American Machinist
American Paint Journal
American Paint & Oil Dealer
American Printer
American School Board Journal
Architectural Record
Automobile Dealer and Repairer
Automobile Journal
Automotive Industries

Baker's Helper
Baker's Weekly
Boiler Maker (The)
Boot and Shoe Recorder
Brick and Clay Record
Building Age & The Builders Journal
Buildings and Building Management
Building Supply News

Canadian Grocer
Canadian Machinery & Manufacturing News
Canadian Railway & Marine World
Candy and Ice Cream
Chemical & Metallurgical Engineering
Clothier and Furnisher
Coal Age
Concrete
Cotton

Daily Metal Trade
Domestic Engineering
Dry Goods Economist
Drygoodsman
Dry Goods Reporter

Electric Railway Journal
Electrical Merchandising
Electrical Record
Electrical World
Embalmers' Monthly
Engineering and Mining Journal-Press
Engineering News-Record

Factory
Farm Implement News
Fire and Water Engineering
Foundry (The)
Furniture Manufacturer and Artisan

Garment Weekly (The)
Gas Age-Record
Good Furniture Magazine
Grand Rapids Furniture Record

LIST *of* MEMBERS
(continued)

Haberdasher (The)
Hardware Age
Hardware & Metal
Heating and Ventilating Magazine
Hide and Leather
Hospital Management
Hotel Monthly
Hotel Review

Illustrated Milliner
Implement & Tractor Trade Journal
Industrial Arts Magazine
Industrial Engineer
Inland Printer
Iron Age
Iron Trade Review

Lumber
Lumber World Review

Manufacturers' Record
Marine Engineering & Shipping Age
Marine Review
Millinery Trade Review
Mill Supplies
Modern Hospital (The)
Motor Age
Motorcycle and Bicycle Illustrated
Motor Truck
Motor World

National Builder
National Cleaner & Dyer
National Laundry Journal
National Miller
National Petroleum News
Nautical Gazette
Northwest Commercial Bulletin

Oil News
Oil Trade Journal

Power
Power Boating
Power Plant Engineering
Printers' Ink
Purchasing Agent

Railway Age
Railway Electrical Engineer
Railway Engineering & Maintenance
Railway Mechanical Engineer
Railway Signal Engineer
Retail Lumberman
Rock Products
Rubber Age

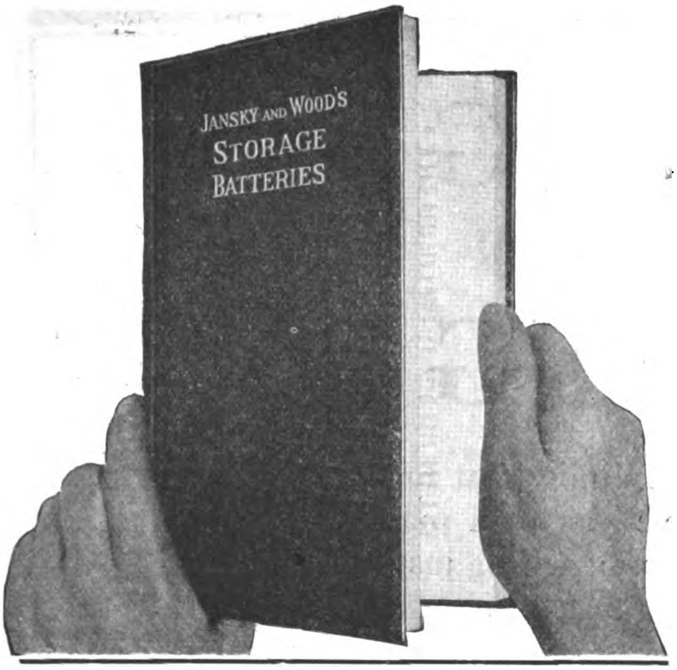
Sanitary & Heating Engineering
Shoe and Leather Reporter
Shoe Retailer
Southern Engineer
Sporting Goods Dealer

Tea and Coffee Trade Journal
Textile World

Welding Engineer
Western Contractor
Wood-Worker (The)

THE ASSOCIATED BUSINESS PAPERS, INC.

JESSE H. NEAL, *Executive Secretary*
HEADQUARTERS: 220 West 42nd STREET NEW YORK CITY



A Storage Battery Book You Will Want—Examine It Free

This new book is intended for both the man with limited technical training and the experienced storage battery man.

It gives a thorough explanation of the principles, operation and maintenance of storage batteries in a clear and practical manner.

Jansky and Wood's

Elements of

STORAGE BATTERIES

240 pages, 6x9, 148 illustrations, $2.50 net, postpaid

The authors have taken the entire subject of storage batteries—have divided it into its important details, large and small—and have treated each clearly and completely.

A Storage Battery "How" Book

How to get the most out of storage batteries. How to use them. How to install them. How to test them. How to clean them. How to charge them. How to assemble and dismantle cells. How to store cells. How to recognize storage battery troubles and how to remedy them. How to determine the proper type and size of battery for specific purposes.

These are some of the things carefully and fully explained in this new book.

The book is one that many electricians have wanted—a book that everyone, interested at all in storage batteries, will want.

Send the coupon for free examination

Send only the coupon for your copy—examine the book—see how it can help—and then keep it or send it back, as you see fit.

FREE EXAMINATION COUPON

McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York.

You may send me on 10 days' approval: **Jansky and Wood's Elements of Storage Batteries $2.50.** I agree to remit for the book or return it postpaid within 10 days of receipt.

......I am a regular subscriber to Electric Railway Journal.

Signed ....

Address ....

Official Position ....

Name of Company ....

(Books sent on approval to retail purchasers in U. S. and Canada only.) E. 12-15-23

An Anderson Sleet Cutter in time will save the line

Stock now—

In justice to yourself and your patrons, who do not always understand your winter troubles, be prepared for the day that the wire will be thick with ice and sleet.

Insurance against a sleet storms is a very small item when figured in terms of Anderson Sleet Wheels and Cutters.

Write today for quotation on your winter's supply

Albert & J. M. Anderson Mfg. Co.

Established 1877

289-293 A St., Boston, Mass.

Branches—New York, 135 B'way. Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St. London, 12 Moor Lane E. C. 2.

Welded—but more than equal to the original metal

PAGE High Carbon Electrodes were used to build up the worn surface at the joint, and the deposit was then ground off flush with the rail.

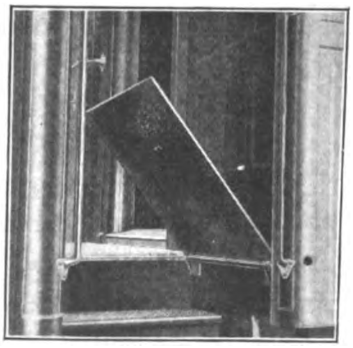
Hardness tests have shown that Page High Carbon Steel Electrodes possess wearing qualities more than equal to the original metal. Thus the use of Page High Carbon Steel for welding worn surfaces reduces the frequency of repairs and minimizes expense as well as traffic delay.

Ease of operation is also an outstanding feature of Page High Carbon Electrodes.

PAGE HIGH CARBON ELECTRODES

PAGE STEEL AND WIRE COMPANY
BRIDGEPORT, CONN.
DISTRICT SALES OFFICES
CHICAGO · NEW YORK · PITTSBURGH · SAN FRANCISCO

Window fixtures
All metal sash balances.
Anti-rattle Compression devices.
Metal stop casings
Top, bottom and side weather stripping
Trap doors and trap door locks.



Edwards Trap Door, with Kick-up Lock, in partly Open Position

Positive Action Absolute Safety

BUILT to provide maximum safety and to open and close easily, Edwards Trap Doors with Kick-up Locks meet the most exacting requirements in modern passenger car construction.

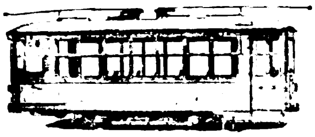
A starting lever in the kick-up lock is typical of the mechanical ingenuity built into all Edwards products. If the door, for any reason, should stick, the starting lever comes in contact with the bottom of the door, forcing it upward a sufficient distance to insure its complete opening automatically. This lever does away with the necessity of all hand lifts.

Because of their durability of construction and simplicity of action, Edwards trap doors should be on all interurban cars.

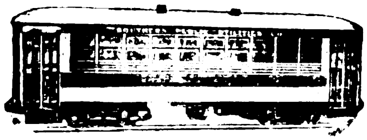
THE O.M.EDWARDS CO. INC.
Main Office and Factory
SYRACUSE, N. Y.

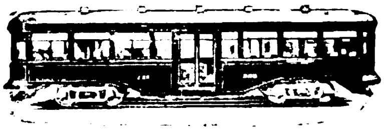
LEADERS SINCE 1887

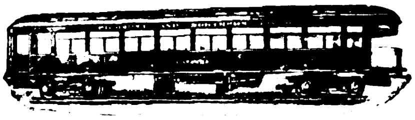
Our Cars Cost Less To Maintain



Safety First







Cars of All Types
From
Birney One-Man Safety
To
Large City and Interurban

SPECIALTIES

Sash, Doors, Interior Finish and Framing, Curtains, Ventilators and Car Trimmings, Brakes, Gongs, Door and Step Mechanism.

"We Satisfy"
Give Us A Trial

Perley A. Thomas Car Works
High Point, N. C.

SPECIFY THIS MARK

S C M A

TRADE MARK REG. U.S. PAT. OFFICE.

ON EVERY TIMBER, BOARD AND BUNDLE of CYPRESS, "The Wood Eternal."

It is your Insurance of true

REPLACEMENT ECONOMY

IT'S THE CONSTANT "LITTLE REPAIRS" THAT BUILD UP EXCESSIVE MAINTENANCE COSTS.

Check up on the cost of the work being done on your line—not the big replacements and new construction work—but just the little jobs—replacing rotted trunking or a few decayed ties, or a bit of fencing, and you will probably be surprised to find how much these items total in the course of a year.

Of course you can never get away from all of this sort of expense, but you can eliminate a surprisingly heavy proportion of it by using

"TIDE WATER"
CYPRESS
"THE WOOD ETERNAL"

not only on new construction, but on all replacement work.

All-heart Cypress comes nearest to being "decay proof" of any lumber in the market suitable for railway use.

Several of the largest railway companies in the country have found the use of Cypress a paying investment.

The data that substantiates this fact will be promptly furnished, if you ask for it.

Southern Cypress Mfrs'. Assn.
1265 Poydras Building
New Orleans, La.
or
1265 Graham Building
Jacksonville, Fla.

These THERMIT RAIL WELDS

Still in Prime Condition After Ten Years of Service

A typical 10-year-old Thermit weld on Shady Avenue

These photographs were taken in 1922 of Shady Avenue, between Penn and Fifth Avenues, Pittsburgh, where Thermit rail welds installed in old track in 1912 are still in excellent condition after ten years' service.

Send for our new Rail Welding Pamphlet 1232.

SERVICE STRENGTH THERMIT WELDING ECONOMY

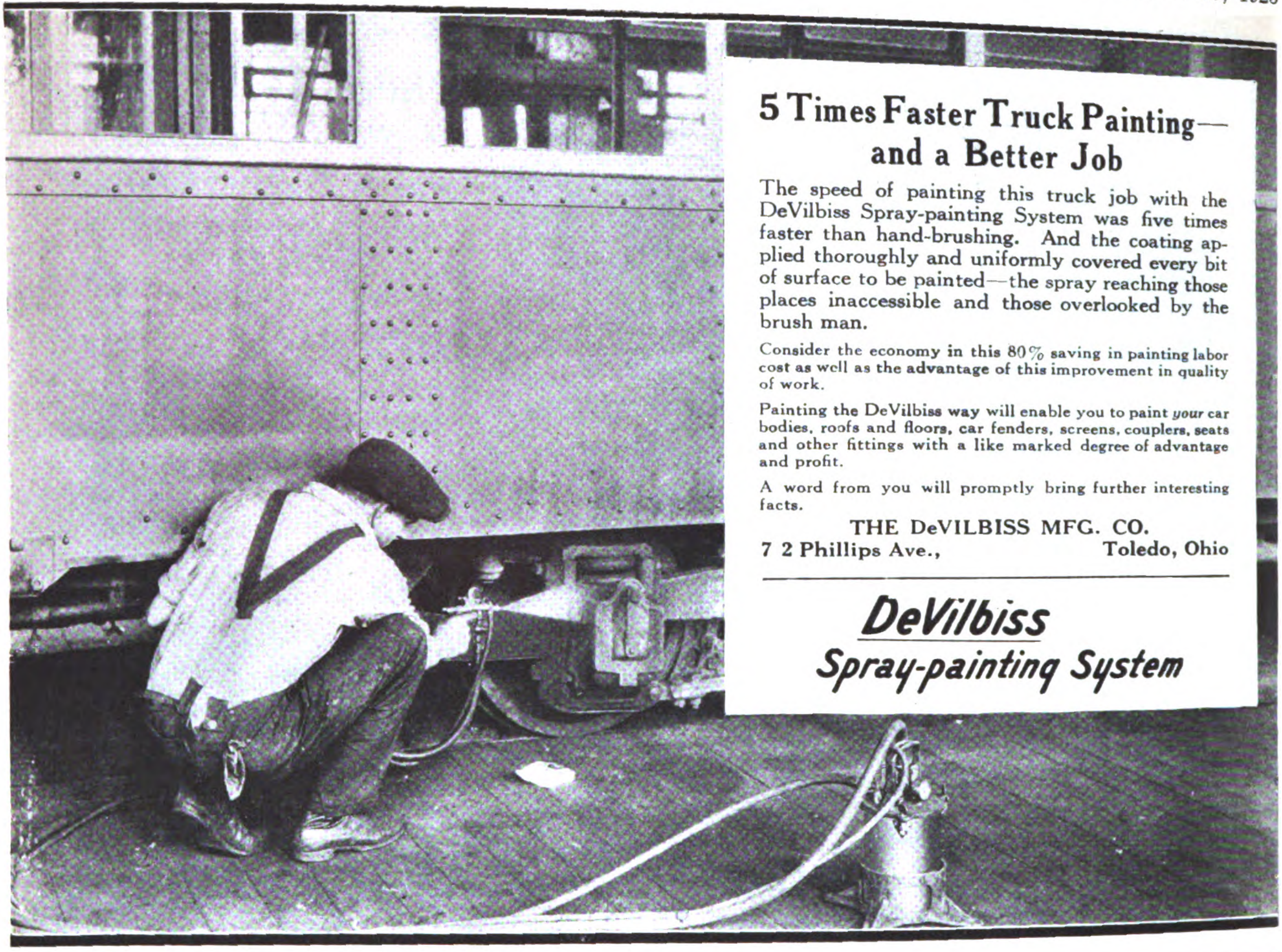
Metal & Thermit Corporation

120 Broadway, New York

PITTSBURGH CHICAGO BOSTON S. SAN FRANCISCO TORONTO

Watch your gears on "Safety Cars" & "Baby motors". The superiority of Tool Steel hardening is more pronounced on the fine teeth than on coarser pitches.

The Tool Steel Gear & Pinion Co., CINCINNATI, O.



5 Times Faster Truck Painting—and a Better Job

The speed of painting this truck job with the DeVilbiss Spray-painting System was five times faster than hand-brushing. And the coating applied thoroughly and uniformly covered every bit of surface to be painted—the spray reaching those places inaccessible and those overlooked by the brush man.

Consider the economy in this 80% saving in painting labor cost as well as the advantage of this improvement in quality of work.

Painting the DeVilbiss way will enable you to paint *your* car bodies, roofs and floors, car fenders, screens, couplers, seats and other fittings with a like marked degree of advantage and profit.

A word from you will promptly bring further interesting facts.

THE DeVILBISS MFG. CO.
7 2 Phillips Ave., Toledo, Ohio

DeVilbiss
Spray-painting System

You will run No Risk
You will not get A Substitute
You will get Real Protection

with the

LIFE GUARD that made a World Record

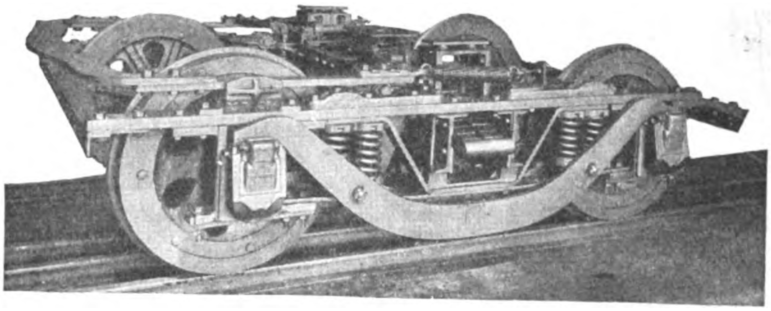
If You Specify

"To be manufactured by the Consolidated Car Fender Co."

Wendell & MacDuffie Co.
Sales Agents
110 East 42nd St., New York, N. Y.

H. B. LIFE GUARDS

Chatter-Proof Brakes on all Baldwin Improved Motor Trucks For Electric Railways



Baldwin Class "AA" Motor Truck, built for the Osaka Railway, Japan

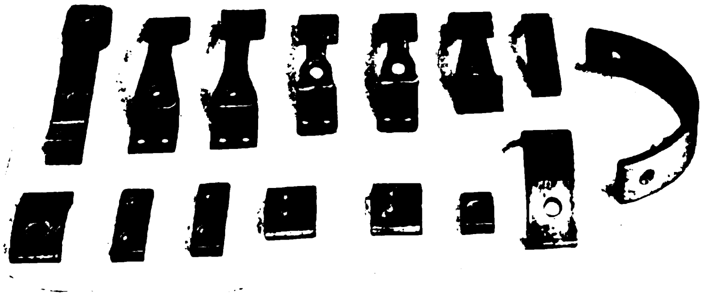
AMONG the many notable features of Baldwin Electric Motor and Trailer trucks for high speed electric interurban and street railway service, are the brakes and the method of brake suspension. Internationally known as the simplest and best design of brake.

Baldwin Brakes are always to be depended upon

Baldwin representatives in all principal countries of the world.
Detailed information upon request.

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA, U. S. A. Cable Address, "Baldwin, Philadelphia"



The COLUMBIA Standard Fingers and Segment Burning Tips

—insure good contact with the shunt finger spring

COLUMBIA MACHINE WORKS

3313 Atlantic Ave., Brooklyn, N. Y.

Heywood-Wakefield
REG. U.S. PAT. OFF.

Thank You Mr. Moroso!

—but it *should* be so with 97 years behind us

Mr. Moroso, General Storekeeper of New York's Great Third Avenue Railway System writes us:—

> "Perhaps it would be gratifying for you to know that the (snow sweeper) rattan received is undoubtedly the finest grade that has been received by us since the writer's connection with the company. Not only is the quality superior, but the uniformity of the product comes nearer to our specifications than any other shipment of this material that we have received. This means a great deal to our mechanics in making the broom heads."

It's just the same with Car Seats

You can't spend 97 years on a product without producing something worth while. You'll find it in the trim appearance, the roomy comfort and the underlying structural strength of Heywood-Wakefield Car Seats.

Write or phone to our nearest office for prices and illustrations.

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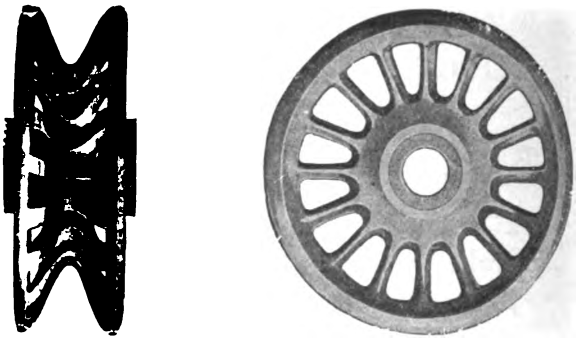
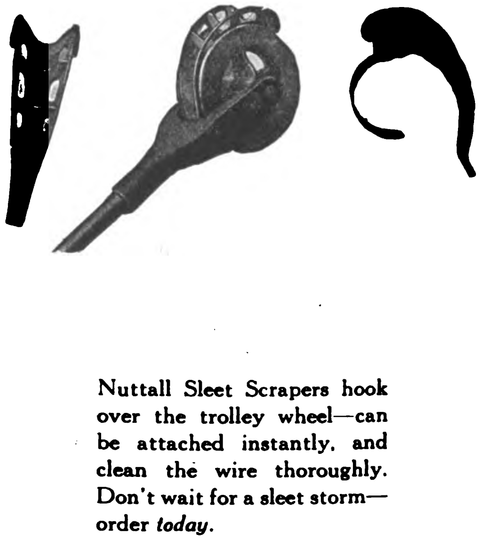
SLEET CUTTING DEVICES



Nuttall Sleet Wheels replace the standard trolley wheels and efficiently clean sleet coated wires.



Nuttall Sleet Scrapers hook over the trolley wheel—can be attached instantly, and clean the wire thoroughly. Don't wait for a sleet storm—order *today*.

R.D.NUTTALL COMPANY
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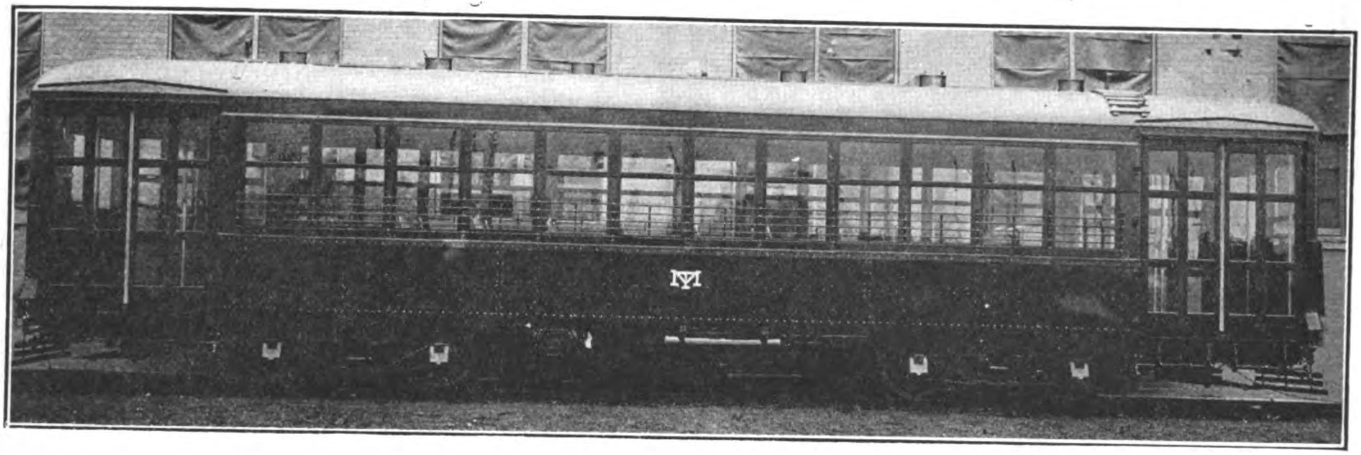
All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co. Ltd., Montreal and Toronto.

The Universal Safety Car



When we talk about efficient service in connection with the Universal Safety Car we don't speak of something that will be or that was, but that IS! These cars *are* giving the service that pleases passengers and keeps the company using them on the upgrade.

It's the proper balance between weight and strength that gives them the speed and the ability to stand up under all kinds of service. They are economical to operate, low in maintenance costs, and most reasonable in initial cost. Built for one and two-man operation.

Write for figures before buying new cars.

St. Louis Car Company, St. Louis, Mo.

"The Birthplace of the Safety Car"

Griffin Wheel Company
McCormick Building
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GRIFFIN
F. C. S.
WHEELS

For Street and Interurban Railways

FOUNDRIES:

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Brake Shoes
A.E.R.A. Standards

Diamond "S" Steel Back is the Best Type

Standard Patterns for

SAFETY CAR

D-67 for Narrow Treads
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American Brake Shoe and Foundry Co.
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Protect Your
Highway Crossings

with Nachod Highway Crossing Signals. They prevent damage suits, and let you sleep easier at night. Furnished with bell, wig wag and flashing lights, independently operated. Also singly, or in any combination.

NACHOD SIGNALS

for highway crossings are described in Catalog 720. They are operated from trolley power by high speed overhead trolley contractors without moving parts. Our Catalog 719 tells about Nachod Block Signals; and the Manual about the automatic Headway Recorder for timing cars.

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Louisville, Kentucky

AMERICAN ELECTRICAL WORKS
AMELECTRIC
Wires and Cables
PHILLIPSDALE, R.I.
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AMELECTRIC PRODUCTS
BARE COPPER WIRE AND CABLE
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No. 2

AIMco
REG. U.S. PAT. OFF.
Electric Railway Automatic Signals

for Accessibility and Reliability

EST. 1865 AIMco INC. 1916
"American" Insulating Machinery Company
REG. U.S. PAT. OFF.
Philadelphia, New York, Paris, England

Sales Agents:
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U. S. ELECTRIC AUTOMATIC SIGNAL
for single track block signal protection
United States Electric Signal Co.
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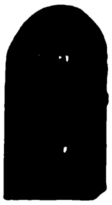

Hubbard Trolley Pole Bands

Are made to meet every requirement. Galvanized the Hubbard Way.

Solid Split

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Pittsburgh Chicago

Standard Underground Cable Co.
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STANDARD UNDERGROUND CABLE CO.
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Manufacturers of
Copper, Brass, Bronze Wires, Rods, Tubes
Copper Clad Steel Wire
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INSULATED WIRES AND CABLES
JOHN A. ROEBLING'S SONS CO., TRENTON, NEW JERSEY

Transmission Line and Special Crossing Structures, Catenary Bridges
WRITE FOR OUR NEW DESCRIPTIVE CATALOG
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Drip Points for Added Efficiency

They prevent creeping moisture and quickly drain the petticoat in wet weather, keeping the inner area dry.

The Above Insulator—No. 72—Voltages—Test—Dry 64,000. Wet 31,400. Line 10,000.

Our engineers are always ready to help you on your glass insulator problem. Write for catalog.

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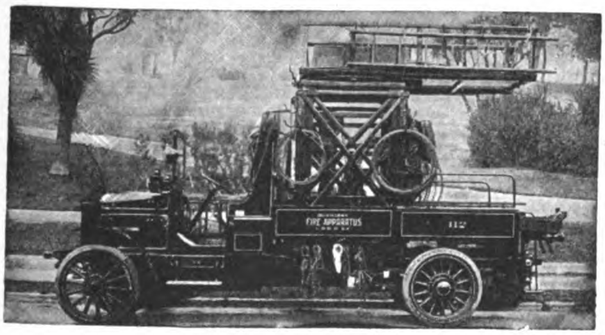
Muncie, Ind.
Est. 1848—Inc. 1870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TRENTON TOWER
This 3-Section

is not only more convenient, but stronger than the older type.

The top section is reinforced by the intermediate section. The 3-section design makes it possible to raise the platform 16 inches higher and drop it 12 inches lower than can be done with the old-style 2-section tower.

We'll gladly send you details.

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Trenton, New Jersey, U. S. A.

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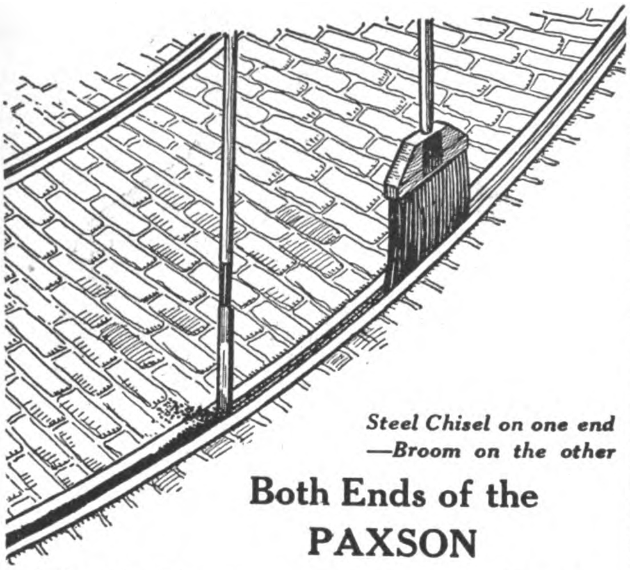
KERITE INSULATED WIRE & CABLE COMPANY
NEW YORK CHICAGO

GET OUT, DIRT!



Steel Chisel on one end
—Broom on the other

Both Ends of the
PAXSON
Track Broom are *Business* Ends

—for which reason they have been the choice of railway men for 25 years.

Made of flat steel spring wire. Fits frogs, switches and grooves. Has strong ash handle with steel chisel on other end. Broom is light in weight but strong in construction. Send for a sample—you will be pleased.

J. W. PAXSON CO.
Manufacturers
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Track Grinding
is inexpensive with
SEYMOUR
MIDGET RAIL GRINDERS

It's a one-man machine—easy to operate, easy to move, easy to maintain. Notice its simple, compact construction. Will do any kind of grinding, surface, gauge line, switch points, etc.

Especially desirable
because its first cost is low.

E. P. Seymour Rail Grinder Co.

Quick deliveries on orders placed now. Ask for prices.

Waltham
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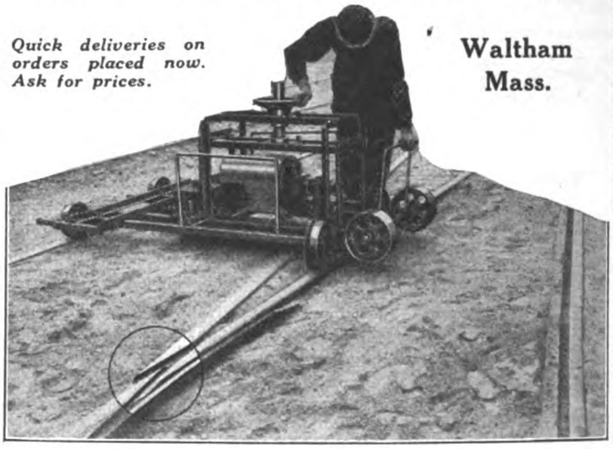

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A
FRICTION TAPE
THE OKONITE COMPANY
PASSAIC, N.J.
U.S.A.

are
Okonite
Products

'Nuff Said!

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THE OKONITE COMPANY
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Write for Samples and Circulars

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Incorporated 1884
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Agents: Central Electric Co., Chicago, Ill.; Pettingell-Andrews Co., Boston, Mass.; The F. D. Lawrence Electric Co., Cincinnati, Ohio; Novelty Electric Co., Philadelphia, Pa.

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TRADE MARK
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International Creosoting
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Plant—Texarkana Beaumont Galveston

MONEY SAVERS TO RAILWAYS

Treated railway ties, poles, piling, bridge timbers, etc.

See our full page advertisement in last week's issue.

Shaw Lightning Arresters
Standard in the Electric Industries
for 35 years
Henry M. Shaw
150 Coit St., Irvington, Newark, N. J.

Metal Safety Railway Tie Co.
522 North American Bldg., Philadelphia, Pa.
All-metal cross ties
Types for open and closed tracks
"More flexible than wood"
See advertisement, issue, Sept. 29, page 86.
Ask for circular on either type. *Prices upon application.*

RAMAPO AJAX CORPORATION

Ramapo Automatic Return Switch Stands for Passing Sidings

RACOR
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RACOR Tee Rail Special Work.

Manganese Construction

GENERAL OFFICES: HILLBURN, NEW YORK
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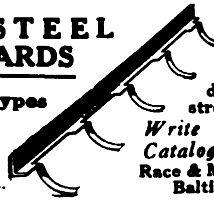
GODWIN STEEL
PAVING GUARDS

Adapted to all types of rails and paving.

W. S. GODWIN CO., Inc.



Proven by service to economically prevent seepage and disintegration of street railway paving.

Write for Illustrated Catalog No. 20.
Race & McComas Sts.,
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An up-to-date and most economical process for the Aluminothermic welding of rail joints. Makes the joint stronger than the rail itself.

Feralite Welded Joint

Special advantages — (1) Rail ends are butted together and easily aligned, no inserts needed to fill in or adjust. (2) Smaller portions of material used. (3) Grinding reduced to the minimum, only a slight touching up is needed.

The Feralite Rail Welding Process eliminates rail joints at a lower cost than any other process. Write for full details.

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UNITED STATES
TWIN TERMINAL
SOLDER
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Arc Weld and Flame Weld

Send for new
Rail Bond Book

American Steel & Wire Company
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High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
COMPLETE LAYOUTS
IMPROVED ANTI-KICK BIG-HEEL SWITCHES
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New York Switch & Crossing Co.
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Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY
Johnstown, Pa.

Sales Offices:
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Series Type

Arc Welding and Bonding Outfit

Rugged series resistance coil
Indestructible Mica insulation
Normal welding current at half voltage

The Electric Railway Improvement Co.
Cleveland, Ohio

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BARBOUR-STOCKWELL CO.
205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of
Special Work for Street Railways

Frogs, Crossings, Switches and Mates
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ESTIMATES PROMPTLY FURNISHED

WHARTON
Special Trackwork
For Street and Steam Railways

Steel Castings Gas Cylinders
ORIGINATORS OF
Manganese Steel Trackwork

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Bayonne, N.J.
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Makers of Steam Superheaters
since 1898 and of Chain Grate
Stokers since 1893

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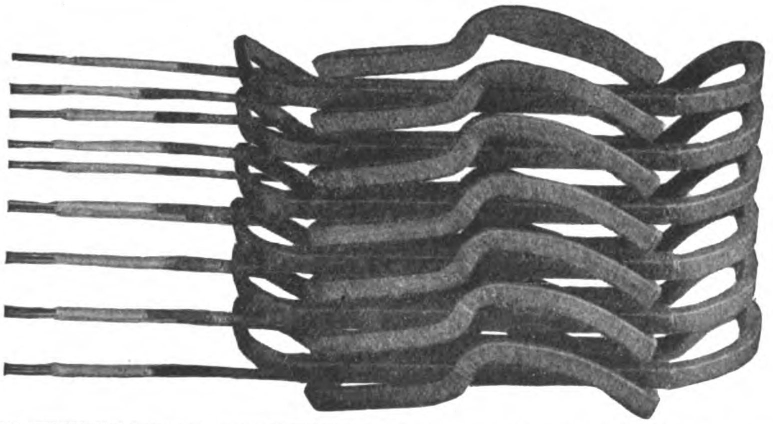


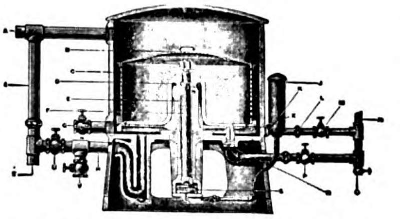
Motor Overhaul Is Expensive

Your replacement coils should be absolutely dependable.

More than thirty years experience in the production of armature and field coils for railway motors has qualified us to give you coils which will stand up in the most severe service. They are made in a shop specializing on this work alone. Every job receives the constant supervision of a manager who has made coils ever since the days of coil-wound armatures.

Let us quote you our prices

Elliott-Thompson Electric Co.
Ajax Building, Cleveland, Ohio



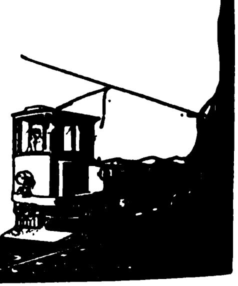
Don't throw the oily waste away!

Save Money By Reclaiming It!

This oil extracting machine is reclaiming hundreds of gallons of perfectly good lubricating oil and many pounds of waste for the Milwaukee Electric Railway & Light Co. as well as many other companies. It will do the same for you. It is widely used as a real economy producing equipment.

Write for full details

OIL & WASTE SAVING MACHINE CO.
Philadelphia, Pa.



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An automatic dump car, an electric locomotive, a snow plow, and a freight car—all in one. Big savings shown in track construction and maintenance, paving work, coal hauling, ash disposal, snow removal, and freight transportation.

The Differential
Steel Car Co.
Findlay, Ohio

ALLIS-CHALMERS
MILWAUKEE, WIS. U.S.A.

Electrical Machinery, Steam Turbines, Steam Engines, Condensers, Gas and Oil Engines, Air Compressors, Air Brakes

BUCKEYE JACKS
High-grade R. R. Track and Car Jacks
The Buckeye Jack Mfg. Co.
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FORD TRIBLOC

A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only block that carries a five-year guarantee.

FORD CHAIN BLOCK CO.
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A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

193
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10224

Type R-10

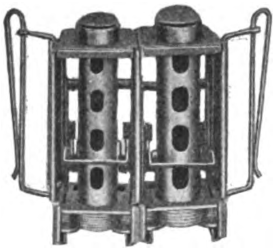
International Registers

Made in various types and sizes to meet the requirements of service on street and city system. Complete line of registers, counters and car fittings.

Exclusive selling agents for HEEREN ENAMEL BADGES.

The International Register Co.
15 South Throop Street, Chicago, Illinois

JOHNSON Universal Changer



Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

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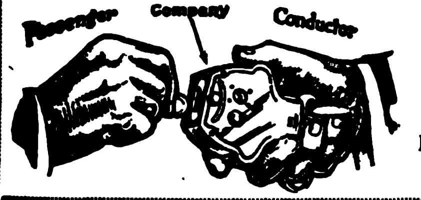

Direct Automatic Registration By the Passengers

Rooke Automatic Register Co.
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Fare Boxes *Change Carriers*

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COUNTERS SORTERS WRAPPERS

THE CLEVELAND FARE BOX CO.
CLEVELAND, OHIO
Canadian Branch, Preston, Ontario.

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED

No. 478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

N-L VENTILATORS

for Electric Railways and Motor Buses.
Unexcelled for ventilation and appearance.

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N-L Products manufactured and sold in Canada by
Railway and Power Engineering Corporation, Ltd.
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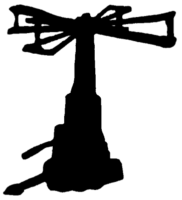
For Silk Screen Reproduction of car signs, posters, notices, etc.

Faster, better and cheaper than open stencil work. Easy to use, adaptable and economical. Especially valuable where over fifty reproductions are required.

Many railway companies have found it affords a big economy in preparing their own route and destination signs, display posters, etc. Some users are: Los Angeles Ry. Corp. — Pacific Electric R. R. Co. — Brooklyn-Manhattan Transit Corp. — Indianapolis Street Ry. — Indianapolis, Terre Haute & Eastern Traction.

Full details on request

KRESS & CO.
370 Gold St., Brooklyn, N. Y.



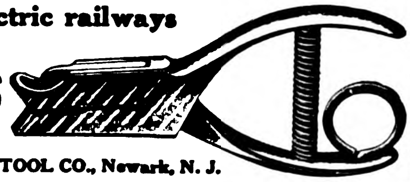
Gets Every Fare

PEREY TURNSTILES or PASSIMETERS

Use them in your Prepayment Areas and Street Cars

Perey Manufacturing Co., Inc.
30 Church Street, New York City

75% of the electric railways use B-V Punches



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PS HEATERS

Car Heating and Ventilation

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

The Peter Smith Heater Company
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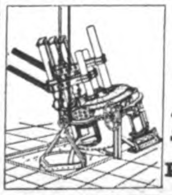

Moore Rapid Lectromelt Furnaces

Ten Standard Sizes 1/16 to 24 Tons Capacity
Most Rapid and efficient for making
Tool Steels, Alloy Steels, Forging Steels
Steel Castings, Malleable Iron, Grey Iron
Carbide, Ferro-Alloys etc.

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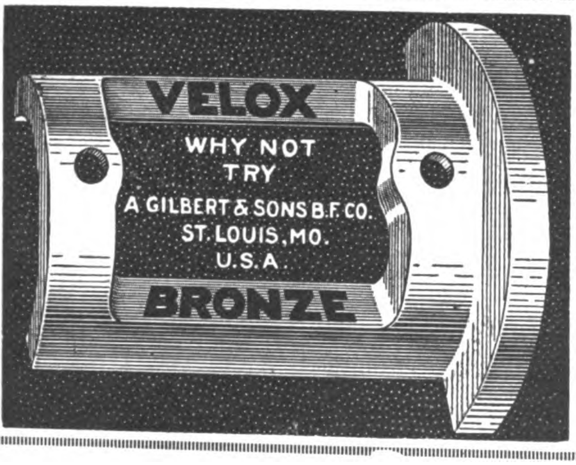
Ohmer Indicating and Recording Fare Registers

are especially well adapted for use in one-man cars, either for city or interurban service.

The operation is quick and snappy. Each fare is clearly indicated and a correct printed record made of it.

Ohmer Fare Registers offer the only means of placing fare collecting on an absolutely correct business basis.

OHMER FARE REGISTER CO.
Dayton, Ohio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A GILBERT & SONS B.F. CO.
ST. LOUIS, MO.
U.S.A.
BRONZE

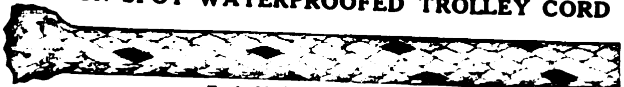
"Boyerized" Products Reduce Maintenance

Bemis Trucks
Case Hardened Brake Pins
Case Hardened Bushings
Case Hardened Nuts and Bolts
Manganese Brake Heads
Manganese Transom Plates
Manganese Body Bushings
Bronze Axle Bearings

Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

Bemis Car Truck Co., Springfield, Mass.

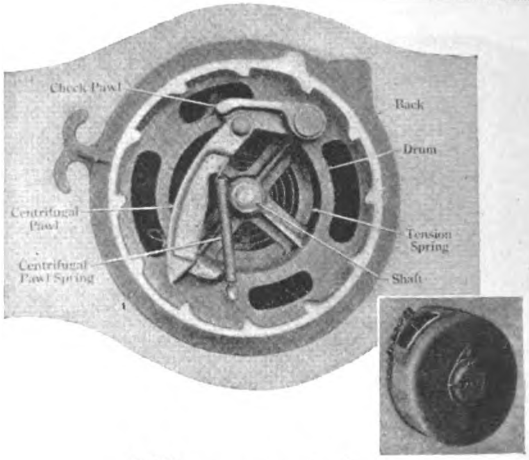
SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off.

Made of extra quality stock firmly braided and smoothly finished.
Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.



All new catchers are good—

But when they wear so that the pole is checked too late, they're junk. The short fat check pawl of

Earll Catchers and Retrievers

engages full face-on. No points or edges to wear or batter. Even aged Earlls check the pole as promptly as when new. Throughout an almost endless life they always operate promptly —another one of the five exclusive Earll Catcher and Retriever Features.

Like to know the other four? We'd like to tell you.

C. J. Earll York, Pa.

Canadian Agents:
Railway & Power Engineering Corp., Ltd., Toronto, Ont
In All Other Foreign Countries:
International General Electric Co., Schenectady, N. Y.

100 New Users in the Last Nine Months
KASS SAFETY TREADS
HIGH
in efficiency and lasting qualities
LOW
in weight, initial and upkeep costs
Morton Manufacturing Co., Chicago

CHILLINGWORTH
One-Piece Gear Cases
Seamless—Rivetless—Light Weight
Best for Service—Durability and Economy. *Write Us.*
Chillingworth Mfg. Co.
Jersey City, N. J.

The Most Successful Men in the Electric Railway Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

SAFETY TREADS

Universal Safety Tread Company
Offices in all Principal Cities
40 Court Street Send for Catalogue RR Boston, Mass

SEARCHLIGHT SECTION

USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.00,

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

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1 to 3 inches..............$4.50 an inch
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Rates for larger spaces, or yearly rates, on request.
An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

E.R.J.

POSITIONS VACANT

DRAFTSMEN-COMPUTERS wanted on railway trackwork working knowledge of and facility in trigonometry essential. State in letter, age, education, experience and approximate salary. Employment Dept., Bethlehem Steel Co., Steelton, Pa.

SHOP foreman wanted for interurban car shop handling eight or ten cars, doing cleaning, inspection and light repairs; excellent opportunity for right man. State experience and salary expected. P-628, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

POSITIONS WANTED

ENGINEER of equipment, technical graduate, with several years' experience. PW-623, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT of transportation and equipment, with eighteen years' experience, open for position of superintendent or manager, Jan. 1. PW-629, Electric Railway Journal, Real Estate Trust Bldg., Phila., Pa.

SUPERINTENDENT of transportation, at present with a large successful property that has been placed on a sound basis largely through efforts of advertiser, solicits correspondence or interviews with managers of city and suburban properties that require effort and ability to get results. A wide practical experience places me in a position to build up an efficient organization that would be a credit to any property. Also recognized as an economical operator, quick to locate leaks and correct same. High grade references from present employers as to character and ability to get results regardless of size or condition of property. Personal reasons for desiring a change. PW-604, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

MASTER mechanic, city or interurban railway; experienced on all branches, fourteen years' experience. PW-619, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

FOR SALE

50—G. E. No. 80-A Motors.
50—Controllers, K-28-B; K-12.
35—B-2 Compressors.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

FOR SALE

RELAYING RAIL

30 Tons 5-in. 80 lb. A.S.C.E. Section. Lengths 30-33-ft. Excellent condition.

ALBANY SOUTHERN R. R. CO
Rensselaer, N. Y.

Receiver's Sale of Property and Franchises of Northern Massachusetts Street Railway Co.

Notice is hereby given that D. P. Abercrombie Receiver of Northern Massachusetts Street Railway Company pursuant to decree of the Supreme Judicial Court of Massachusetts, sitting in Suffolk Country, entered November 9, 1923, in the case of William Gilmour v. Northern Mass. Street Railway Company No. 35532 Equity, *will receive sealed bids* for the purchase of all the property and franchises of the Northern Massachusetts Street Railway Company, at the office of the Receiver, Greenfield, Massachusetts, *up to ten o'clock A. M. on December* 27, 1923, at which time said bids will be opened.

The property is to be sold in parcels which are fully described in circular on file at the office of the Receiver in Greenfield. Copies of this circular may be had upon application.

D. P. ABERCROMBIE, Receiver, P. O. Box 614, Greenfield, Mass.

Three Electric Cars

New cars still in the shop, modern in every way, 45 passengers, standard gauge, designed for interurban service in Cuba, each equipped with two G. E. 50 hp. motors for D.C. 1200 v. Acquired by judgment. We will sell cheap.

The Davison Chemical Company
Garrett Building, Baltimore

Good Relaying Rails

Are as Serviceable as New Rails, with a Big Saving on the Price

We have ready for prompt shipment First-Class Relaying Rails in various weights. Get in touch with us, stating what weight rail and tonnage desired, and we will submit quotations.

HYMAN-MICHAELS COMPANY
531 Peoples Gas Bldg., Chicago
OFFICES AND PLANTS AT
St. Louis, Mo. Detroit, Mich.
Pittsburgh, Pa.
1324 Woolworth Bldg., New York City.
San Francisco, Cal. McKees Rocks, Pa.

FOR SALE

RAILWAY MOTORS

2—Unused General Electric, type 210-H. 50% of market price.

GEORGE SACHSENMAIER CO.
926 N. Third St., Philadelphia, Pa.

FOR SALE

MOTORS

28 WHs 101-B-2 Motors
10WHs 101-D Motors

TRANSIT EQUIPMENT COMPANY
501 Fifth Avenue, New York.

RAILS

Cars, Locomotives, Tanks, Steel Piling
Fairbanks-Morse Standard Gage Gasoline Motor Car; Seats 34 people

ZELNICKER IN ST. LOUIS

400 Tons 65 lb. rails

"Opportunity" Advertising:

Think "*SEARCHLIGHT*" First!

0098

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.
Air Receivers & Aftercoolers
Ingersoll-Rand Co.
Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Armature Shop Tools
Elec. Service Supplies Co.
Automatic Return Switch Stands
Ramapo Ajax Corp.
Automatic Safety Switch Stands
Ramapo Ajax Corp.
Axles
Bemis Car Truck Co.
Bethlehem Steel Co.
St. Louis Car Co.
Axle Straighteners
Columbia M. W. & M. I. Co.
Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Westinghouse E. & M. Co.
Babbitting Devices
Columbia M. W. & M. I. Co.
Badges and Buttons
Elec. Service Supplies Co.
Int. Register Co., The
Barges, Steel
American Bridge Co.
Bearings and Bearing Metals
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Gilbert & Sons B. F. Co., A.
St. Louis Car Co.
Westinghouse E. & M. Co.
Bearings, Center and Roller Side
Baldwin Locomotive Works
Stucki Co., A.
Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Heati'g Co.
Elec. Service Supplies Co.
St. Louis Car Co.
Boilers
Babcock & Wilcox Co.
Bond Testers
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.
Bonds, Rail
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Page Steel & Wire Co.
Railway Track-work Co.
Westinghouse E. & M. Co.
Book Publishers
McGraw-Hill Book Co.
Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
American Bridge Co.
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.
Brake Adjusters
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.
Brake Shoes
Amer. Br. Shoe & Fdy. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
Brakes, Brake Systems and Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.
Bridges & Buildings
American Bridge Co.
Brooms, Track, Steel and Rattan
Amer. Rattan & Reed Mfg. Co.
Paxson Co., J. W.
Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse E. & M. Co.
Brushes, Wire, Pneumatic
Ingersoll-Rand Co.
Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Bunkers, Coal
American Bridge Co.
Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.
Bus Seats
Hale-Kilburn Co.
Heywood-Wakefield Co.
Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.
Cables, (See Wires and Cables)
Cambric Tapes, yellow and black varnished
Irvington Varnish & Ins. Co.
Carbon Brushes (See Brushes, Carbon)
Car Panel Safety Switches
Westinghouse E. & M. Co.
Cars, Dump
Differential Steel Car Co.
St. Louis Car Co.
Car Lighting Fixtures
Elec. Service Supplies Co.
Car Panel Safety Switches
Consolidated Car Heati'g Co.
Cars, Passinger, Freight, Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Thomas Car Works, P. A.
Wason Mfg. Co.
Cars, Gas, Rail
St. Louis Car Co.
Cars, Second Hand
Davison Chemical Co., The
Rec'v'r Northern Mass. St. Railway Co.
Electric Equipment Co.
Transit Equipment Co.
Cars, Self-Propelled
General Electric Co.
Car Signal System
Fahnestock Elect. Co.
Castings, Brass, Composition or Copper
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Castings, Gray Iron and Steel
American Bridge Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
Castings, Malleable and Brass
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
Catchers and Retrievers, Trolley
Earll, C. I.
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.
Catenary Construction
Archbold-Brady Co.
Ceiling Car
Pantasote Co., The
Change Carriers
Cleveland Fare Box Co.
Circuit-Breakers
General Electric Co.
Westinghouse E. & M. Co.
Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Cleaners and Scrapers, Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
St. Louis Car Co.
Cloth, Stencil Silk Sign
Kress & Co.
Clusters and Sockets
General Electric Co.
Coal and Ash Handling (See Conveying and Hoisting Machinery)
Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Elec. Service Supplies Co.
Coils, Armature and Field
Columbia M. W. & M. I. Co.
Economy Elec. Devices Co.
Elliot-Thompson Elec. Co.
General Electric Co.
Westinghouse E. & M. Co.
Coils, Choke and Kicking
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
Coin Counting Machines
Cleveland Fare Box Co.
Intern'l Register Co.
Coin Sorting Machines
Cleveland Fare Box Co.
Coin Wrappers
Cleveland Fare Box Co.
Commutator Slotters
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
Commutator Truing Devices
General Electric Co.
Commutators or Parts
Cameron Elec'l Mfg. Co.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Mica Insulator Co.
Westinghouse E. & M. Co
Compressors, Air
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.
Compressors, Air Portable
Ingersoll-Rand Co.
Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
Condensor Papers
Irvington Varnish & Ins. Co.
Connectors, Solderless
Westinghouse E. & M. Co.
Connectors, Trailer Car
Consolidated Car Heating Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Controllers or Parts
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse E. & M. Co.
Controller Regulators
Elec. Service Supplies Co.
Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.
Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
Conveying and Hoisting Machinery
Columbia M. W. & M. I. Co.
Copper Wire
Anaconda Copper Mining Co.
Cord, Bell, Trolley, Register,
Brill Co., The J. G.
Elec. Service Supplies Co.
Internat'l Register Co., The
Roebling's Sons Co., John A.
St. Louis Car Co.
Samson Cordage Works
Cord Connectors and Couplers
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.
Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.
Cranes
Allis-Chalmers Mfg. Co.
Universal Crane Co.
Cross Arms (See Brackets)
Crossing Foundations
Internatiional Steel Tie Co.
Crossings
Ramapo Ajax Corp.
Crossing Signals (See Signals, Crossing)
Crossing, Frog & Switch
Wharton, Jr., & Co., Wm.
Ramapo Ajax Corp.
Crossing Manganese
Ramapo Ajax Corp.
Crossings, Track (See Track, Special Work)
Crossings, Trolley
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.
Curtains and Curtain Fixtures
Brill Co., The J. G.
Edwards Co., Inc., O. M.
Elec. Service Supplies Co.
Morton Mfg. Co.
Pantasote Co., The
St. Louis Car Co.
Dealer's Machinery
Elec. Equipment Co.
Hyman, Michaels
Indiana Service Corp.
Zelnick Supply Co., W. A.
Transit Equip. Co.
Derailing Devices (See also Track Work)
Wharton, Jr., & Co., Wm.
Derailing Swiches, Tee Rail
Ramapo Ajax Corp.
Detective Service
Wish-Service, P. Edward
Doors & Door Fixtures
Edwards Co., Inc., O. M.
Hale-Kilburn Co.
St. Louis Car Co.
Door Operating Devices
Brill Co., The J. G.
Consolidated Car Heati'g Co.
General Electric Co.
Nat'l Pneumatic Co., Inc.
Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.
Drills, Rock
Ingersoll-Rand Co.
Drills, Track
Amer. Steel & Wire Co.
Elec. Service Sup. Co.
Ingersoll-Rand Co.
Ohio Brass Co.
Dryers, Sand
Elec. Service Supplies Co.
Ears
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.
Electrical Wires and Cables
Amer. Electrical Works
Roebling's Sons & Co., J. A.
Electric Grinders
Railway Track-work Co.
Rail Welding & Bonding Co.
Seymour Rail Grinder Co.
Electric Rivet Heaters
Amer. Car & Foundry Co.
Electrodes, Carbon
Railway Track-work Co.
Electrodes, Steel
Railway Track-work Co.
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Allison & Co., J. S.
Archbold-Brady Co.
Arnold Co., The
Beeler, John A.
Bibbins, J. Rowland
Buchanan & Layng Corp.
Byllesby & Co., H. M.
Day & Zimmerman, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelly Cooke & Co.
Ong, Joe R.
Richey, Albert S.
Sanderson & Porter
Stevens & Wood, Inc.
Stone & Webster
White Eng. Corp., The J. G.
Wortham, Edwin
Engines, Gas, Oil or Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
Extension Platform Trap Doors
Edwards Co., Inc., O. M.
Fare Boxes
Cleveland Fare Box Co.
Economy Elec. Devices Co.
Nat'l Ry. Appliance Co.
Fences, Woven Wire and Fence Posts
Amer. Steel & Wire Co.
Fenders and Wheel Guards
Brill Co., The J. G.
Consolidated Car Fender Co.
Elec. Service Supplies Co.
St. Louis Car Co.
Star Brass Works
Fibre and Fibre Tubing
Westinghouse E. & M. Co.
Field Coils (See Coils)
Flangeway Guards, Steel
Godwin Co., Inc., W. S.
Flaxlinum Insulation
Nat'l Ry. Appliance Co.
Floodlights
Elec. Service Supplies Co.
Forgings
Carnegie Steel Co.
Columbia M. W. & M. I. Co.
Frogs & Crossings, Tee Rail
Ramapo Ajax Corp.
Frogs, Track (See Track Work)
Frogs, Trolley
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.
Funnel Castings
Wharton, Jr., Inc., & Co. Wm.
Furnace, Electric
Pittsburgh Elec. Furnace Corp.
Furniture, Metal Office
Edwards Co., Inc., O. M.
Fuses and Fuse Boxes
Columbia M. W. & M. I. Co.
Consolidated Car Heati'g Co
General Electric Co.
Westinghouse E. & M. Co.
Fuses, Refillable
Columbia M. W. & M. I. Co.
General Electric Co.
Gaskets
Westinghouse Tr. Br. Co.
Gas-Electric Cars
General Electric Co.
Gas Producers
Westinghouse E. & M. Co.
Gates, Car
Brill Co., The J. G.
St. Louis Car Co.
Gear Blanks
Carnegie Steel Co.
Gear Cases
Chillingworth Mfg. Co.
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Westinghouse E. & M. Co.
Gears and Pinions
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Elec. Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.
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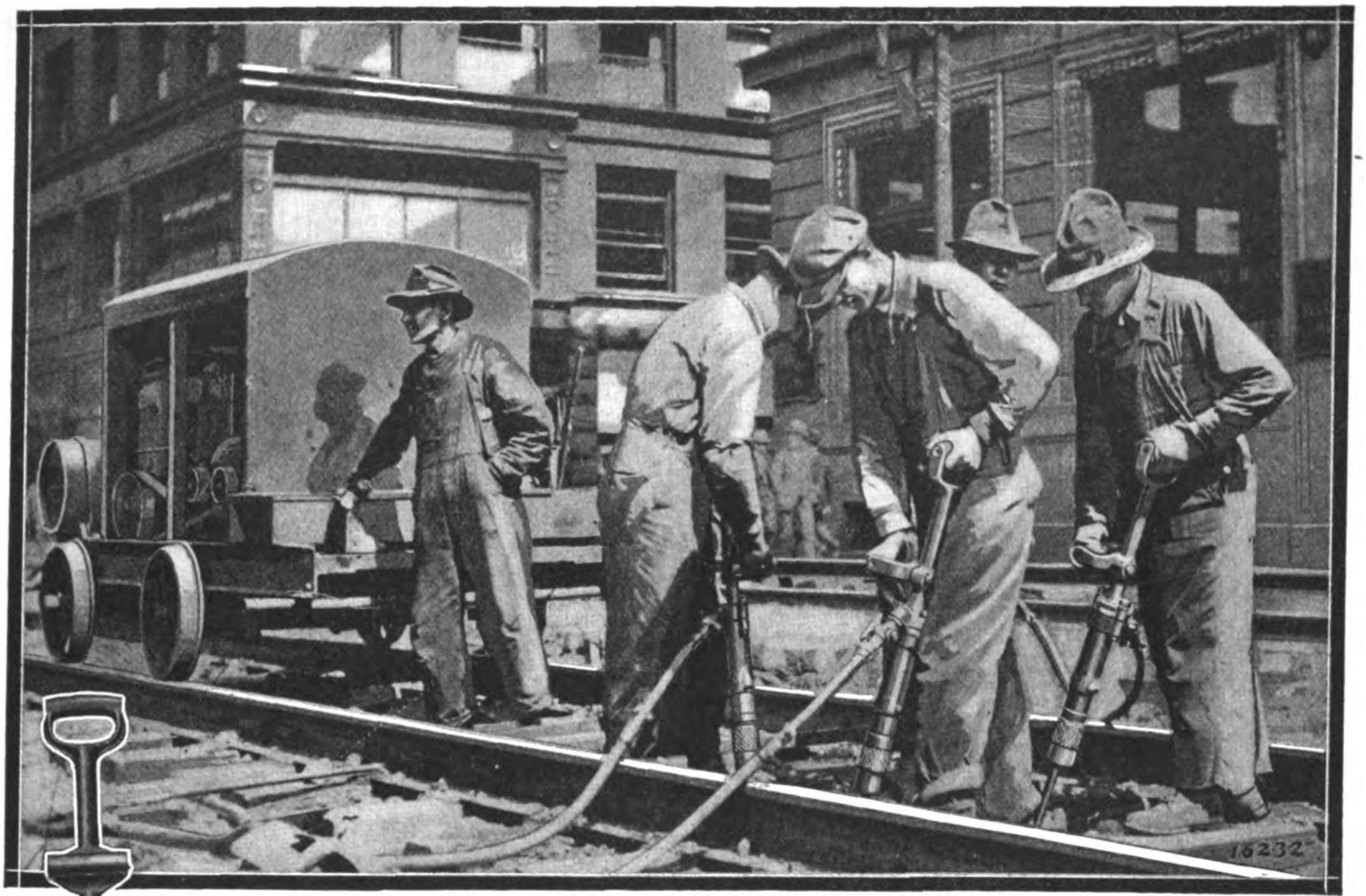
General Electric Co.
Generators
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
Girder Rails
Lorain Steel Co.
Gong (See Bells and Gongs)
Greases (See Lubricants)
Grinders and Grind. Supplies
Metal & Thermit Corp.
Railway Track-work Co.
Grinders, Portable
Railway Track-work Co.
Grinders, Portable Electric
Railway Track-work Co.
Seymour Rail Grinder Co.
Grinding Blocks and Wheels
Railway Track-work Co.
Guard Rail Clamps
Ramapo Ajax Corp.
Guard Rails, Tee Rail & Manganese
Ramapo Ajax Corp.
Guards, Cattle
American Bridge Co.
Guards, Trolley
Elec. Service Sup. Co.
Ohio Brass Co.
Hammers Pneumatic
Ingersoll-Rand Co.
Harps, Trolley
Anderson Mfg. Co., A. & J. M.
Elec. Service Supplies Co.
Nuttall Co., R. D.
Star Brass Works
Thornton Trolley Wheel Co
Headlights
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.
Headlining
Pantasote Co., Inc., The
Heaters, Car (Electric)
Consolidated Car Heati'g Co.
Economy Elec. Devices Co.
Gold Car Heat. & Light. Co
Nat'l Ry Appliance Co., P.
Smith Heater Co., Peter
Heaters, Car, Hot Air and Water
Elec. Service Sup. Co.
Smith Heater Co., Peter
Heaters, Electric Rivet
American Car & Fdry. Co.
Helmets—Welding
Railway Track-work Co.
Hoists and Lifts
Columbia M. W. & M. I. Co
Ford Chain Block Co.
Hoists, Portable
Ingersoll-Rand Co.
Hydraulic Machinery
Allis-Chalmers Mfg. Co.
Indicating Signals
Oakel Equipment Co
Industrial Co-ordination
Sherman Service, Inc.
Instruments Measuring, Testing and Recording
Economy Elec. Devices Co.
Elec. Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co
Insulating Cloth, Paper and Tape
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Stand. Underground Cable Co.
Westinghouse E. & M. Co.



PNEUMATIC TIE TAMPERS

Enable small gangs to equal the work output of large ones

A five-man gang with I-R Pneumatic Tampers will tamp more track and do a better job than sixteen men hand tamping.

INGERSOLL-RAND COMPANY
11 BROADWAY, NEW YORK CITY
Offices in all principal domestic and foreign cities
For Canada refer Canadian Ingersoll-Rand Co., Limited, 260 St. James St., Montreal

Ingersoll-Rand

179-TT

Insulating Silk
Irvington Varnish & Ins. Co.
Insulating Varnishes
Irvington Varnish & Ins. Co.
Insulation (See also Paints)
Anderson, M. Co., A. & J. M.
Electric Ry. Equiptmt. Co.
Electric Service Sup. Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Okonite Co.
Westinghouse E. & M. Co.
Insulators (see also Line Material)
Anderson, M. Co., A. & J. M.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hemingray Glass Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Insulator Pins
Elec. Service Supplies Co.
Hubbard & Co.
Insulators, High Voltage
Lapp Insulator Co., Inc.
Insurance
Travelers Insurance Co.
Jacks (See also Cranes, Hoists and Lifts)
Elec. Service Supplies Co.
Joints, Rail
(See Rail Joints)
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Bemis Car Truck Co.
Brill Co., J. G.
St. Louis Car Co.
Symington Co., The T. H.
Junction Boxes
Std. Underground Cable Co.
Lamps, Guards and Fixtures
Anderson M. Co., A. & J. M.
Elec. Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.
Lamps, Arc & Incandescent (See also Headlights)
General Electric Co.
Westinghouse E. & M. Co.
Lamps, Signal and Marker
Nichols-Lintern Co.
Lanterns, Classification
Nichols-Lintern Co.
Lighning Protection
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Shaw, Henry M.
Westinghouse E. & M. Co.
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Anderson, M. Co., A. & J. M.
Archbold-Brady Co.
Columbia M. W. & M. I. Co.
Electric Ry. Equipmt. Co.
Elec. Service Sup. Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Locking Spring Boxes
Wharton Jr., & Co., Wm.
Locomotives, Electric
Baldwin Locomotive Works
General Electric Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Westinghouse E. & M. Co.
Lockers, Metal
Edwards Co., Inc., O. M.
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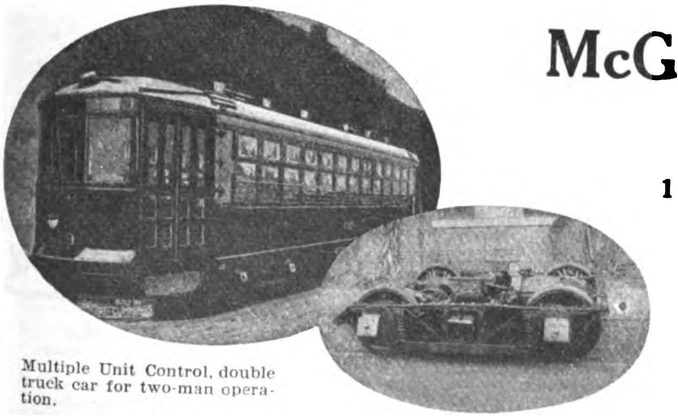

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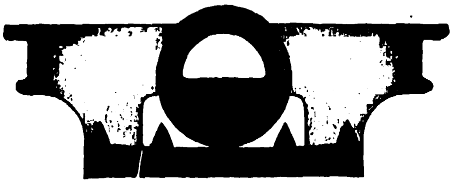

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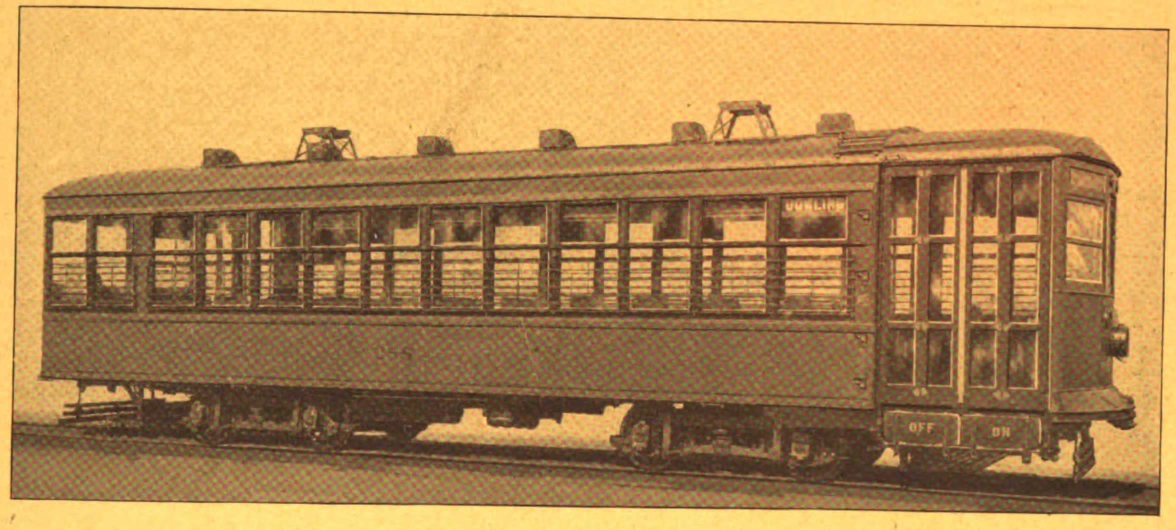

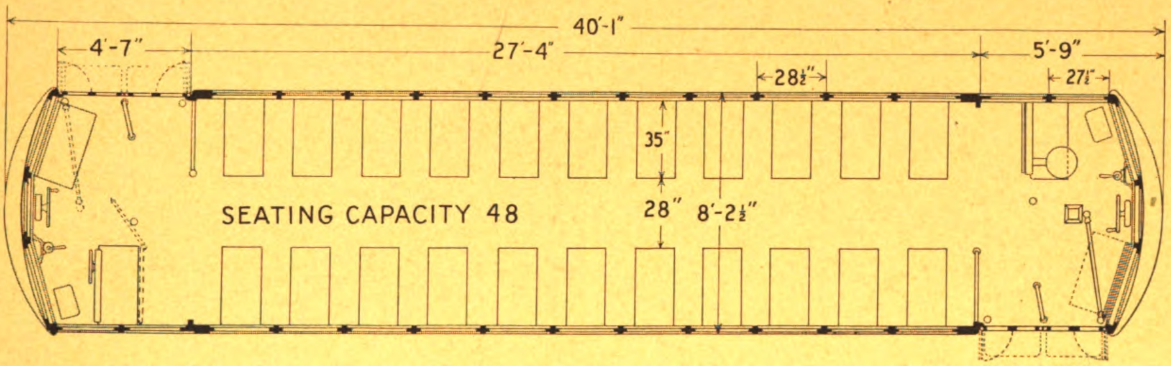

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Twenty-seven cars of this type with separate entrance and exit doors to the operator's right on each platform at diagonally opposite corners and having an aisle width of 28 inches, were built recently by the American Car Company for the Stone & Webster Properties in Texas.

While of larger proportions and arranged to handle larger passenger loads, these cars are constructed in accordance with general safety-car practice, insuring light weight and operating economies as well as being of sufficient strength to meet the transportation requirements.

They are mounted on Brill 77-E-1 Low-Level Trucks.

THE J. G. BRILL COMPANY
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DANGER
33000 VOLTS

G-E to the last bolt

Laid out and built to drawings the same as a turbine or switchboard, and all the material furnished by the General Electric Company. This, together with the services of G-E engineers, will simplify your outdoor station design and installation, besides assuring you maximum economy and reliability.

General Electric Company
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GENERAL ELECTRIC

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ELECTRIC RAILWAY JOURNAL

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TROLLEY
SHOES
Good will

Not only the goodwill of the riding public, but the goodwill of everyone concerned, follows as a natural result of Miller Shoe performance.

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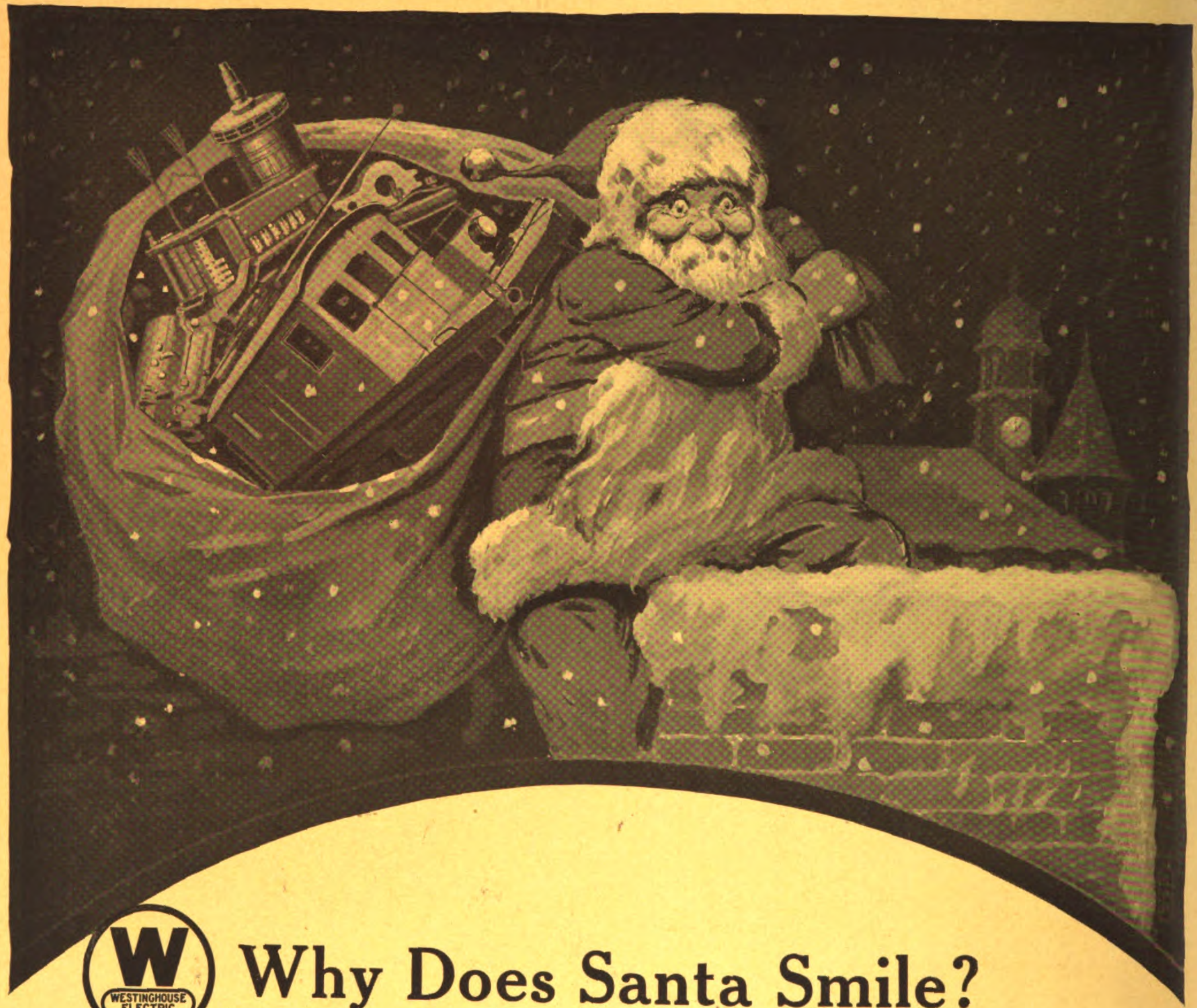

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He is a welcome visitor where e'er he goes, especially when his pack is filled with good things for the Electric Railway Industry.

The Westinghouse Electric Company joins Santa in wishing you the Season's Greetings.

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East Pittsburgh, Pa.
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"Take a Letter to the Industry"

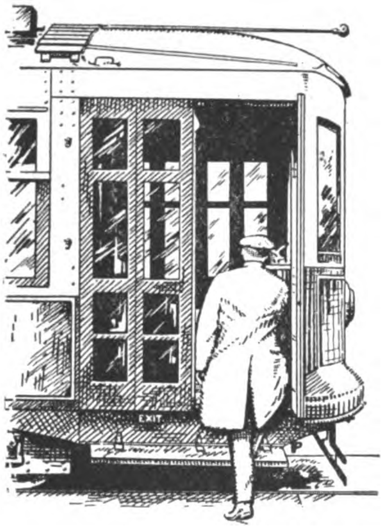
AT THE END of a letter received recently, the general manager of a Pennsylvania street railway commented as follows:

> "It would probably be interesting to you men on the JOURNAL if you could know of the private correspondence that results from articles which you print. This, in itself, is of considerable advantage, and if the JOURNAL did nothing more than to bring about in this way an exchange of views through correspondence, it would be a considerable contribution to the electric railway industry."

We have had knowledge that this has been one of the by-products from reading a publication which strives to keep the field informed of every advance made in the art.

And to make the consequent interchange of ideas of broader value, the JOURNAL has invited and urged men to address their letters of discussion to the entire field by writing them for publication in the "Readers' Forum" section. That invitation is again extended.

Number of Copies Printed, 5,950 **Advertising Index—Alphabetical, 38; Classified, 34, 36; Searchlight Section, 32, 33**



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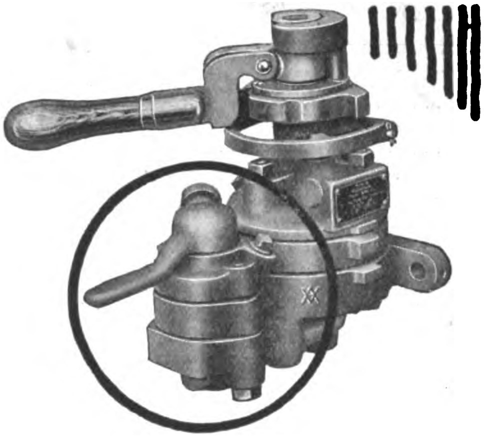

The New SELECTOR VALVE as Incorporated in the Pipe Bracket of the Standard M-28 Safety Car Brake Valve.

Solve the Door Control Problem

The use of double passageways on Safety Cars to facilitate passenger interchange is extremely desirable, but should be accompanied by independent door control. The Door Selector Valve, functioning in connection with the Standard M-28 Safety Car Brake Valve, provides this important feature, making it a simple matter to open or close either door independently, or both together, as occasion demands.

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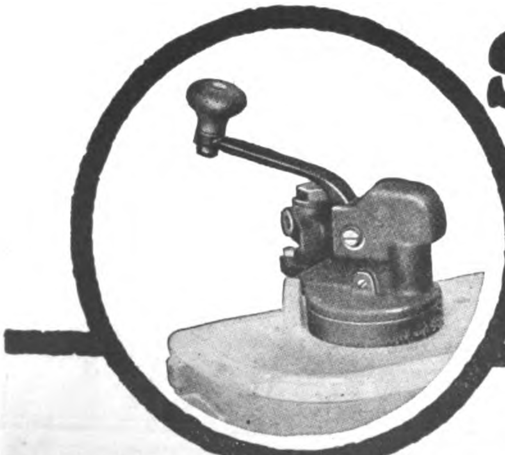
Write for detailed information



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OF ST. LOUIS, MO.
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We furnish the Air Brake and Safety Car Control
Equipment which *makes* the Safety Car

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CITY streets have become so crowded that there is constant competition between the various elements of traffic for the right of way—a natural desire on the part of each "to get there first."

In order to meet this condition and hold their own in the general traffic movement—to maintain satisfactory schedules—street cars must be as mobile as other conveyances which use the streets.

The Variable Load Brake is an effective means of increasing car mobility. By making it practicable to use additional motors for the purpose of higher acceleration, by reducing the average time required for stopping, and by cutting down the running time between stops by allowing longer periods of peak-speed operation, a general speeding-up of service results.

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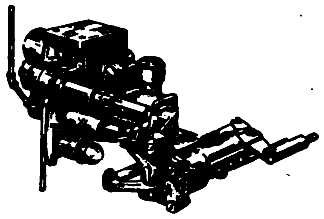

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The Westinghouse Variable Load Brake has been developed to solve the problem of controlling cars under widely varying load conditions. It is an attachment which may be added to any straight air or semi-automatic equipment whereby the braking force is automatically adjusted to suit the weight on the car, by regulating the brake cylinder pressure as the weight changes.

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The use of the Brake insures stopping within a uniform distance regardless of whether the car is empty or loaded.

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Save the Rail, Save All

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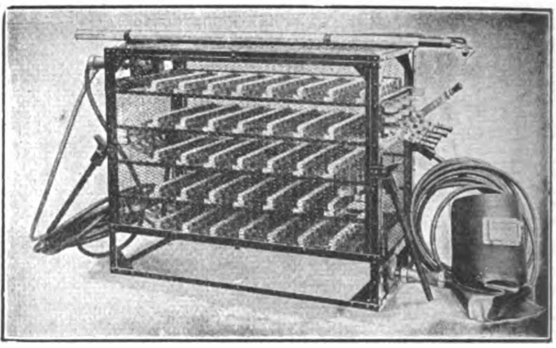

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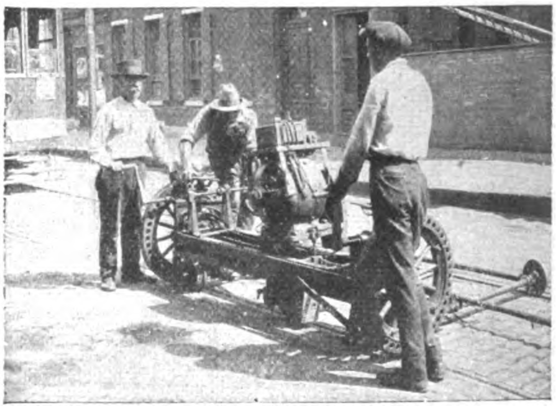

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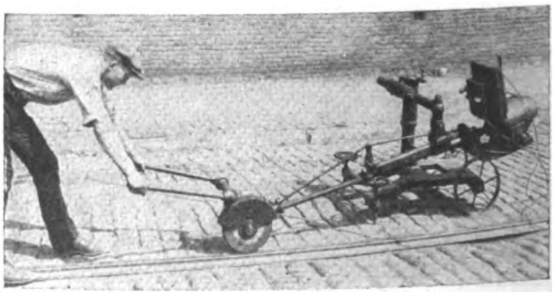
"Atlas" Rail Grinder



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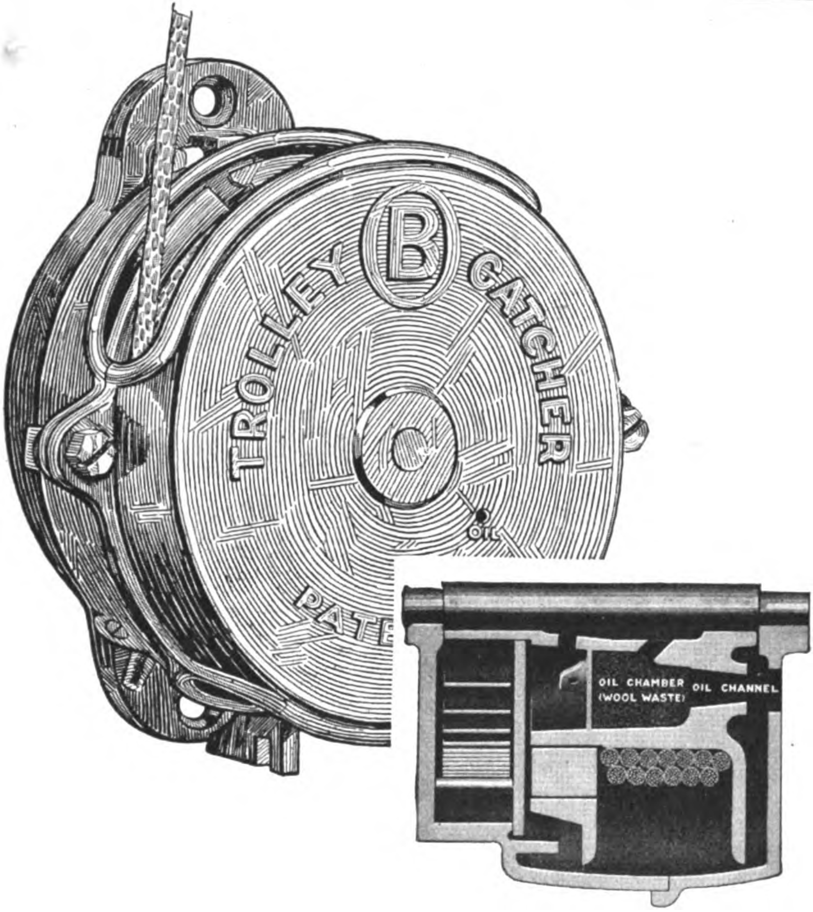
"Reciprocating" Track Grinder



Section thru lower half of O-B Trolley Catcher showing Oil Chamber.

Oil and the O-B Trolley Catcher

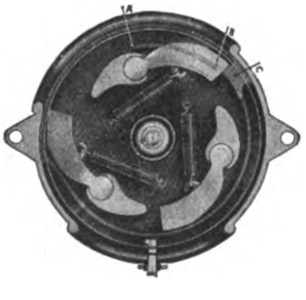
Oil in the O-B Trolley Catcher is simply an additional advantage in a good design, which in itself reduces friction to a minimum. Oil reduces wear in the O-B Catcher which would operate efficiently without oil.

Squirt the oil in the oil hole and the job is done. The chamber is packed with wool waste (note sectional view above) which retains sufficient lubrication for long periods of time.

The oiling scheme on the O-B catcher is effective both on the reel and on the latch dogs—and does not reach the rope.

O-B Catchers are standard on many properties. The addition of the oiling scheme adds popularity to an established favorite.

Each Catcher is packed in an individual corrugated container, effectively labeled and handy for the stock shelf.



The three dogs are thrown out when trolley jumps. One slides over guide (A-B) and engages stop C stopping flight of pole. Guide A-B is longer than distance rebound can back off the dog; hence no "stepping up" of pole.

THE OHIO BRASS CO.
Mansfield, Ohio, U.S.A.

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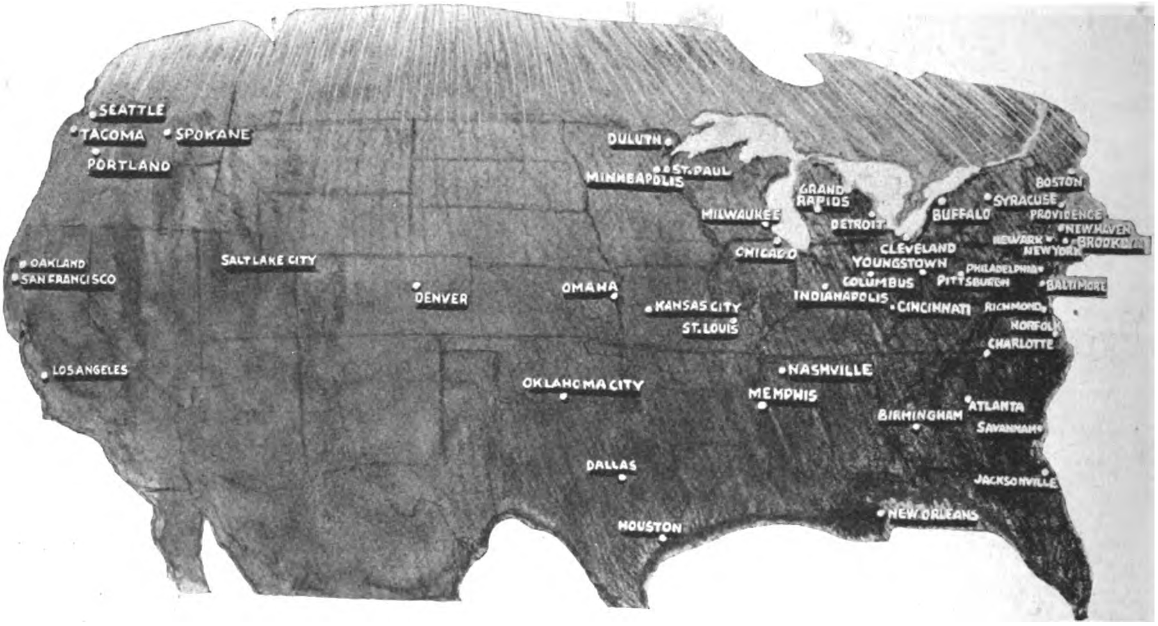
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look around you now
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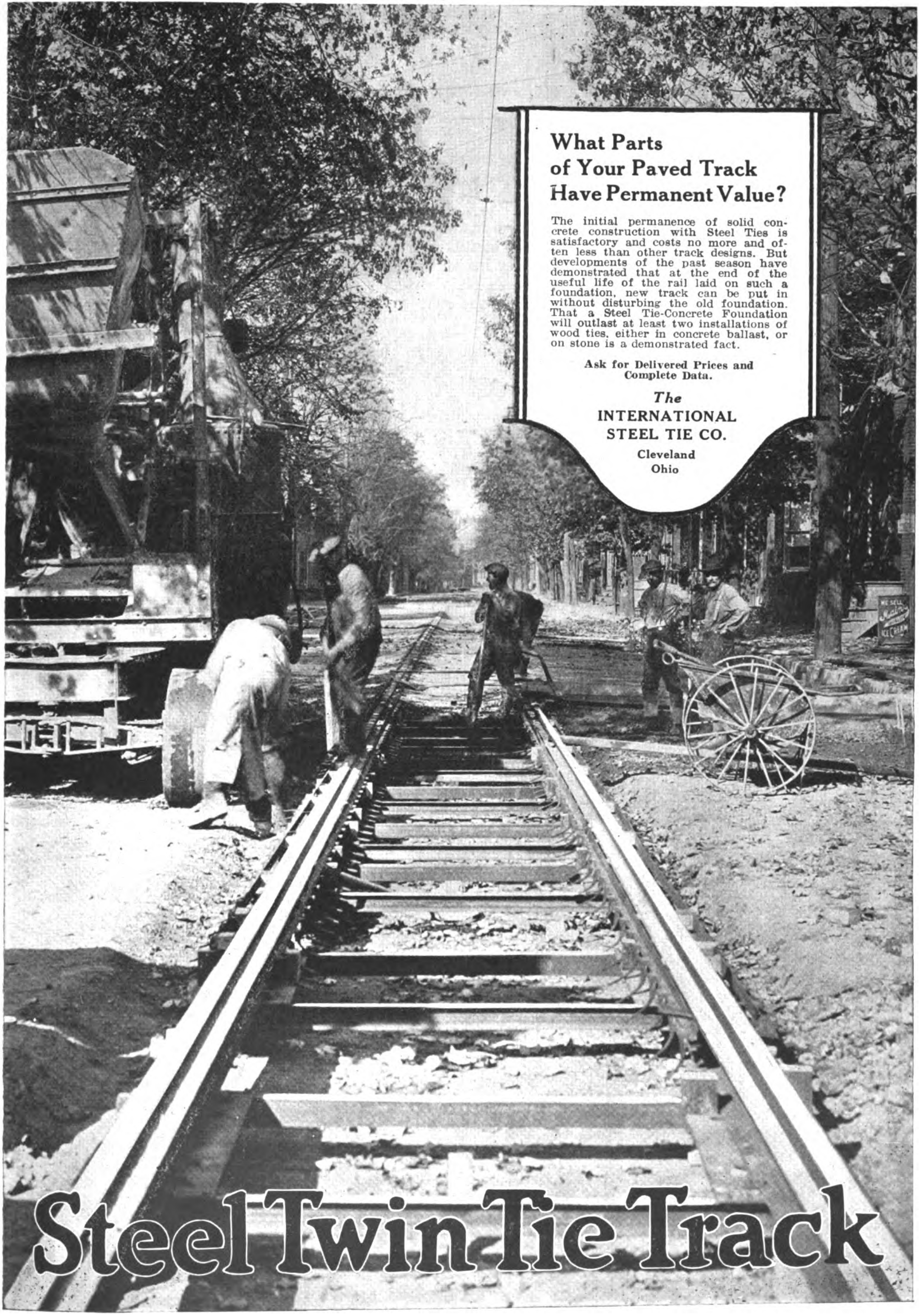

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on the New York, New Haven and Hartford Railroad

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Bates Expanded Steel Truss Co.
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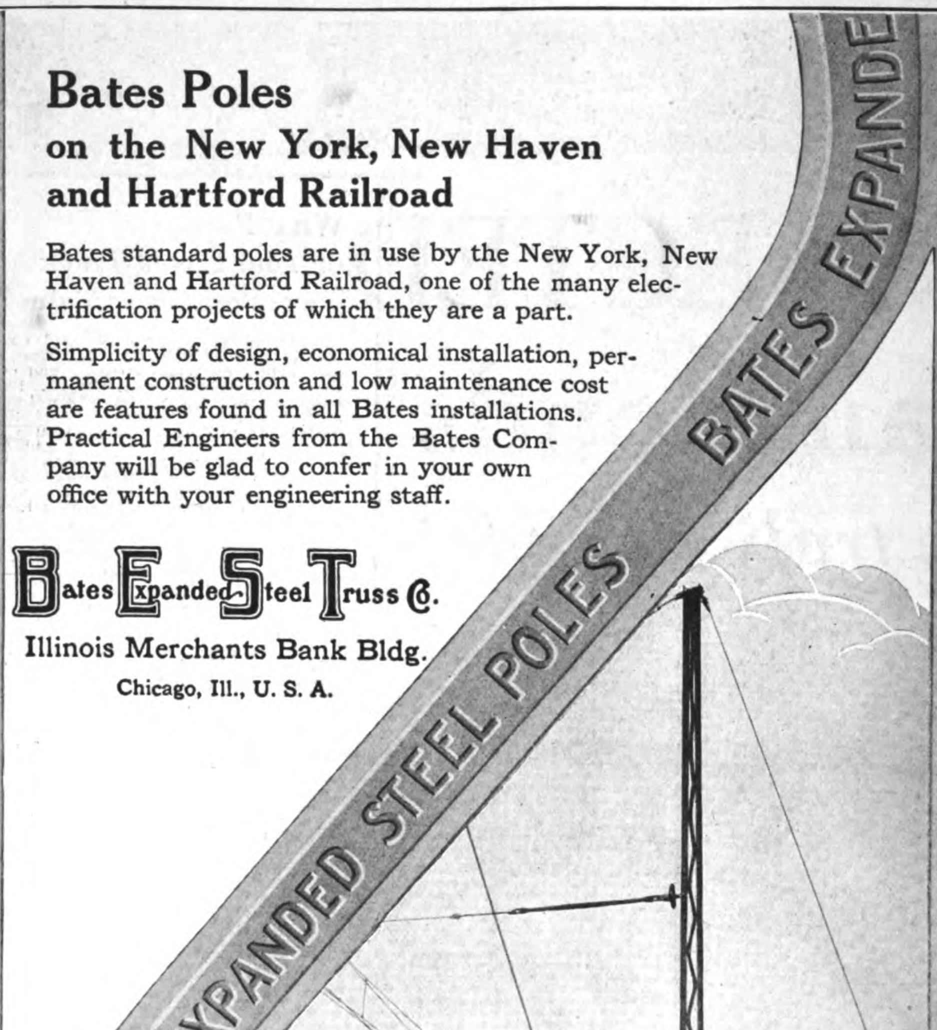
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BATES EXPANDED STEEL POLES
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BATES ONE PIECE EXPANDED STEEL POLES

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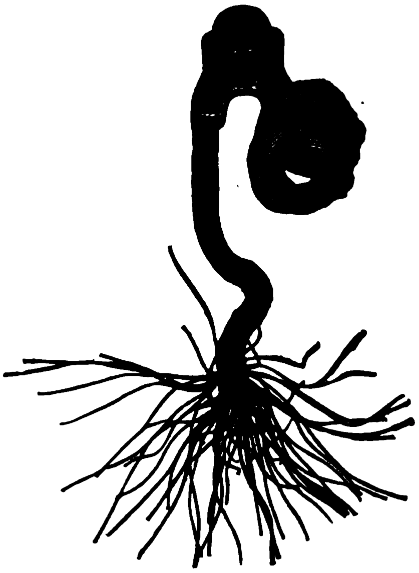
are truly flexible!



—and that's what you want most in a bond, isn't it? Absolute flexibility is what insures longest life without cracking. Vibration and the wearing action at the joint will not crystallize these bonds.

Assembled of finest quality pure drawn ductile copper strands, closely wound. You can curl the connector back on the terminals as shown above without breaking a single strand. *This is* flexibility.

Terminals forged to shape in dies, using only best pure soft copper. They will not crack under compression.

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International Ties are good Ties and do stand up in service. That's why we identify them permanently with the I. C. C. Co. Dating Nail.

Contract now for International Ties, so that we can carefully accumualte them, season and deliver them exactly where and when you need them.

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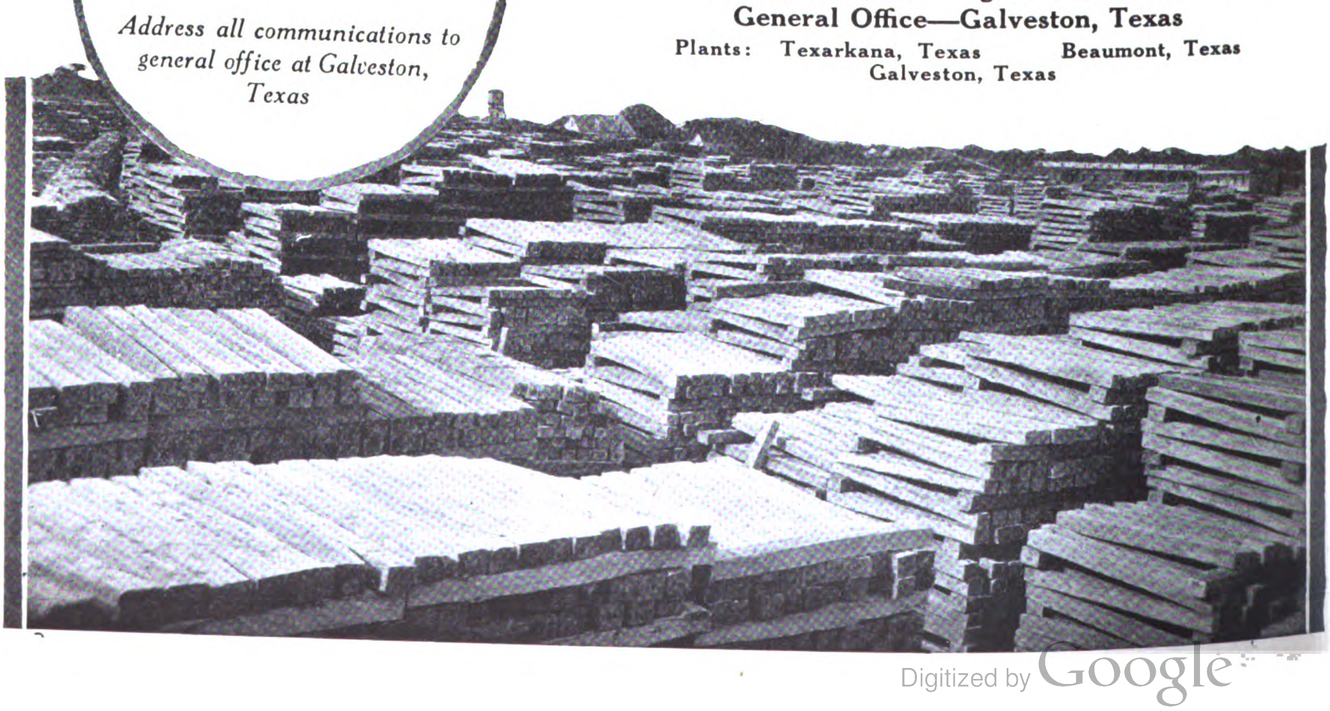

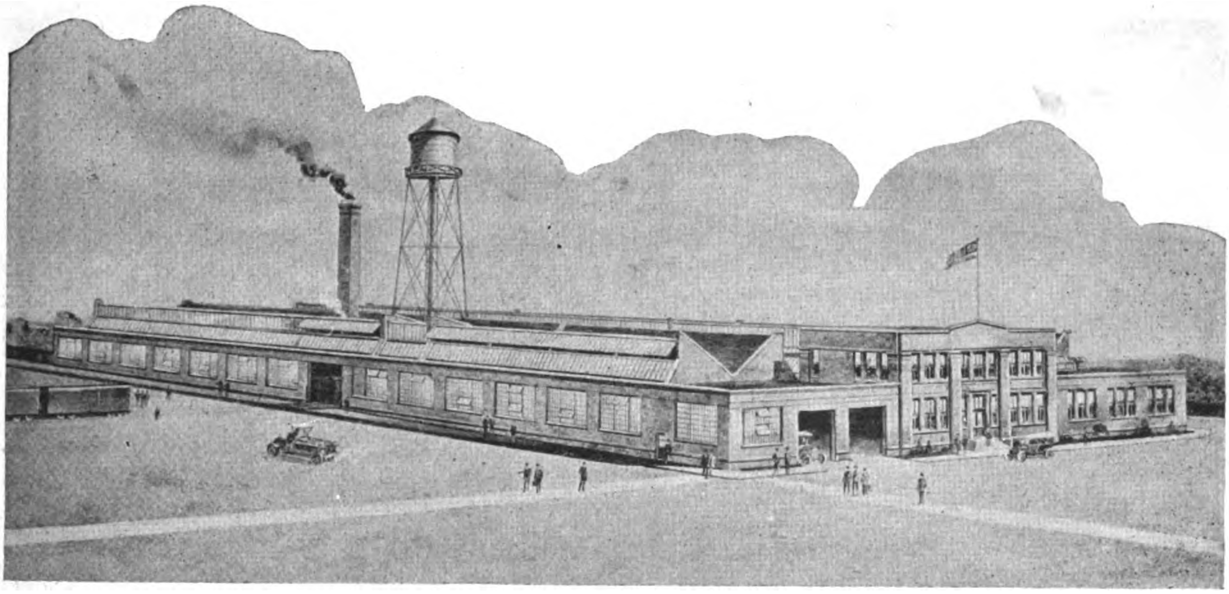

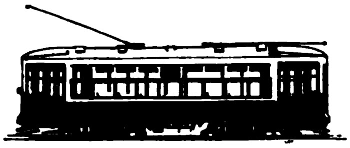

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Twenty years experience, covering the development, perfection and manufacturing of door and step operating equipment has culminated in a plant and organization so specialized as to produce efficient equipment and practical equipment;—equipment, which is better and cheaper than anything you could turn out in your own shops.

NATIONAL PNEUMATIC EQUIPMENT

- DOOR ENGINES
- DOOR AND STEP CONTROL
- OPERATING MECHANISMS
- MOTORMAN'S SIGNAL LIGHTS

NATIONAL PNEUMATIC DOOR ENGINES

have many points of superiority.

Minimum Air Consumption:
No waste due to leakage.
Automatic lubrication keeps cups in good condition.
No packing glands.
Minimum amount of waste space at end of cylinders and in piping.

Permanency:
All parts extra strong and rigid.
Large bearing surfaces.
Enclosed rack and gear keep out all dirt.
Hard drawn manganese bronze valves.

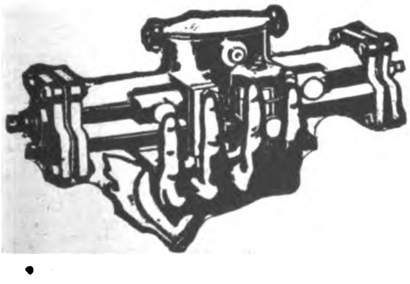
Uniform Operation:
Non-adjustable cushion.
Reserve cushion prevents slamming under all conditions.
Cushioning period regulated by positive mechanical action.

Low Cost of Maintenance:
No packing glands to be repacked.
Non-adjustable cushion.
Automatic lubrication.
Large self-lubricating bearing surfaces.
Rack and gear enclosed.
Hard drawn manganese bronze valves prevent wear.
Periodical overhauling expense low as engines are self-contained and self-aligning.

Small Space Required:
Engine small and compact.
Self-contained.
Self-aligning.

Automatic Lubrication:
Central splash system of oiling.

Reserve Cushion:
Prevents slamming under all conditions.



National Pneumatic Co., Inc.
Originators and Manufacturers
***Principal Office:* 50 Church Street, New York**
Philadelphia—Colonial Trust Building Chicago—McCormick Building
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Manufactured in Canada by Dominion Wheel & Foundry Co., Ltd., Toronto, Ont.

The solid, substantial character of
COLLIER SERVICE
has placed it high among those permanent organizations recognized as National Institutions
Barron G. Collier
INCORPORATED

There are three kinds of fires

And protection against one kind is not necessarily protection against the others

YOUR plant may be as well protected against fire as modern science can make it. You may be one of the few who have exactly what a fire protection engineer would recommend. But—are you sure about it?

From the protection point of view, fires can be divided into three classes: fires in ordinary combustibles; fires in "extra hazardous" inflammables like oil, paint and grease; and fires in live electrical equipment of high voltage.

There is no one extinguishing method adequate for all these fires. What works well in one emergency may fail in another. That is why so many plants are destroyed despite the presence of "fire extinguishers" of one kind or another.

Ask a fire protection engineer whether you are fully covered

The men who represent Foamite-Childs Corporation are equipped to advise you scientifically and without prejudice on the best method of protecting your property. Behind them is a great manufacturing plant where specialists in practical fire-fighting produce *every kind* of chemical extinguishing device and system.

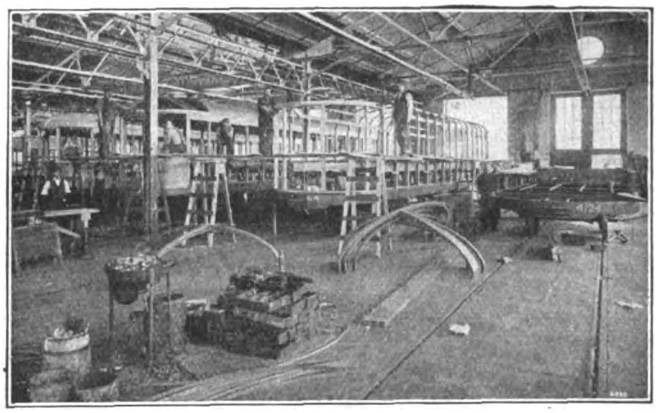
If your fire risks are well covered by your present equipment, a Foamite-Childs man will tell you so. If not, he will recommend a specific installation of one of the methods described below.

FOR BURNING OIL, PAINT, CHEMICALS, and other "extra hazardous" risks, *Foamite* Protection is supremely effective. *Foamite* equipment throws over any burning surface a blanket of carbon dioxide gas bubbles (known as Firefoam) that smothers the fiercest fire. Available in portable hand extinguishers, portable engines, and large stationary systems.

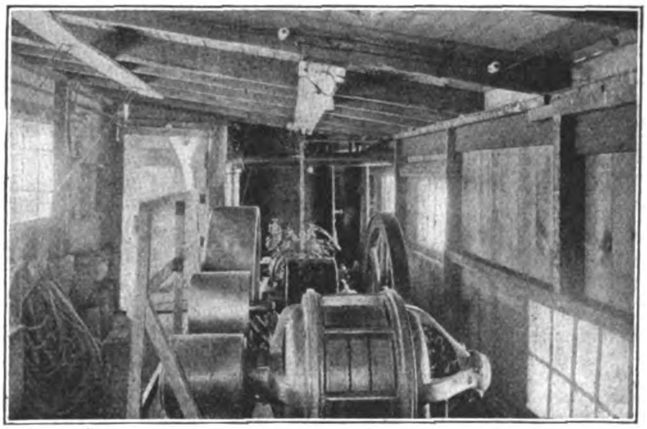
FOR ELECTRICAL FIRES, the *Fire-Gun* is always efficient. Its non-conducting stream stifles combustion in live electrical equipment. Adopted as standard equipment by many leading railroads and public utilities. Widely used for protecting automobiles and trucks.

WHILE FOR ORDINARY RISKS, *Foamite* equipment is the best protection. Where Soda-and-acid apparatus is selected, *Childs* extinguishers and engines have been standard for 27 years.

WHERE IT'S VERY COLD, the *Allweather* non-freezing extinguisher functions perfectly, down to 40° below zero, on ordinary fires.



Extra precautions are required in shops and store-rooms where ordinary fire risks are combined with such special hazards as oil and paint. Here *Foamite* Protection alone is adequate.



Where conditions necessitate housing high-voltage equipment in a frame building, the electrical fire hazard demands primary attention. *Fire-Gun* is the ideal, sure protection in this case.

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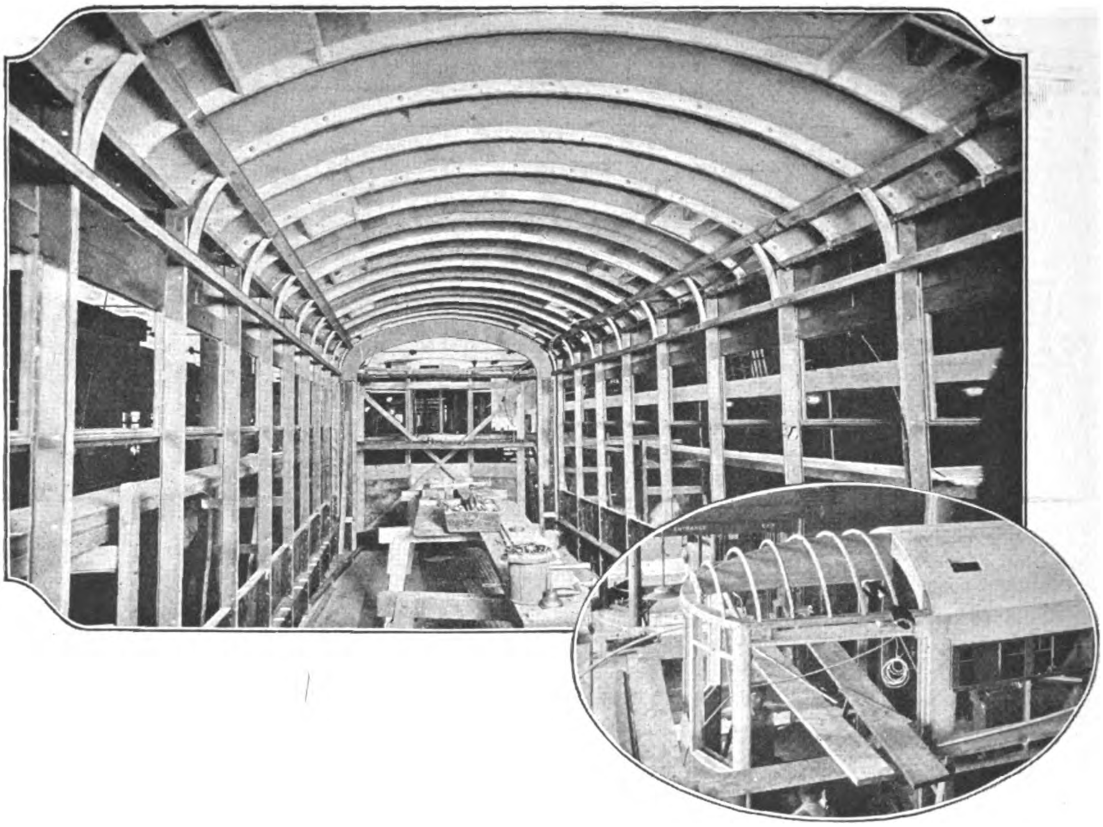

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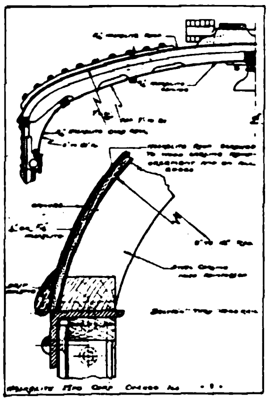

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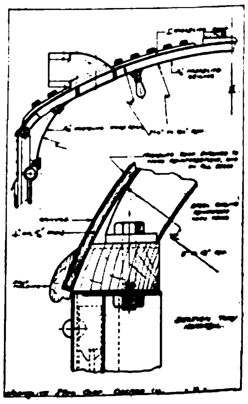

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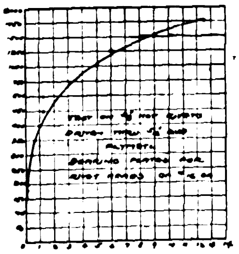

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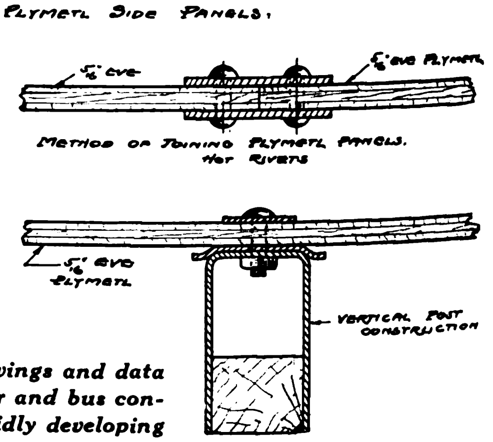
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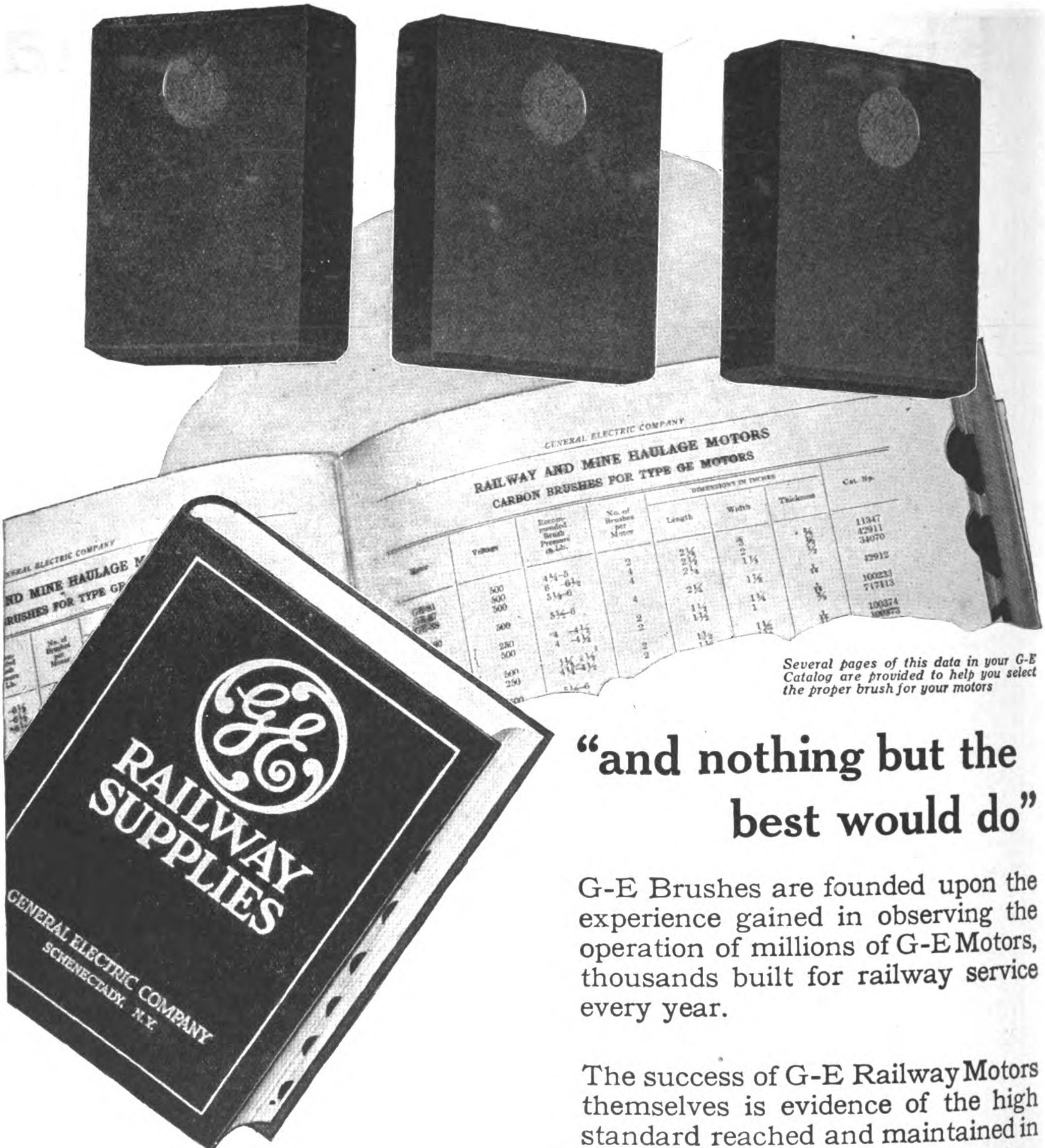
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New York, Saturday, December 22, 1923

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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Henry W. Blake and Harry L. Brown, *Editors*

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Number 25

Remedial and Other Measures for Unraveling Traffic

EVERY city has a traffic problem these days. This fact is generally recognized by most every one, and there is unanimous agreement that something ought to be done about it some time by somebody. Ask any city official what he thinks about traffic congestion. "Isn't it awful," he will say. "But what can we do about it? The streets of this city were not laid out to meet the demands of modern conditions." As far as that goes, none of our cities was laid out to cope with such a situation as exists today.

But that does not mean that nothing can be done about it. There are several remedies available if any one has the courage to try them and to see them through. The trouble often is that as soon as a little opposition develops against any particular plan its proponents weaken and the plan is abandoned or the regulations are not enforced.

It is not necessary to solve the traffic problem for the next ten years at a single stroke in order to get some relief. One step at a time is enough. The thing is to make a beginning. An anti-parking regulation, a one-way street rule, the prohibition of left-hand turns—all these are helpful if enforced. Parking limited to thirty minutes or an hour has generally proved unsatisfactory, as this regulation is easily evaded though it does help some. Complete anti-parking in the business district is really necessary, however, to get any substantial relief. Even then the loading and unloading of trucks and wagons offers considerable obstruction to the free flow of traffic and it may be necessary to limit such use of the street space to the light traffic hours.

In all measures of traffic control the railways should make certain to have a voice, for their interests are those of a considerable proportion of the population. These interests extend beyond the streets on which cars are operated. Often a measure for expediting traffic on one street, or at least with that as its object, may seriously impede vehicular movement on another street.

An example of this is the block signal system installed recently on Michigan Avenue, Chicago. On that boulevard it has brought about a more orderly movement of automobiles and has no doubt contributed to safety. But it has slowed up the speed of vehicles along Michigan Avenue so that many drivers leave the boulevard and take to Wabash Avenue and State Street, the two adjacent parallel streets, as they can make better time. It is said that if you ask a driver of the Yellow Cab Company—the concern which paid for the installation of the signals in Chicago—to get you somewhere quickly, he avoids Michigan Avenue. It is also amusing gossip in Chicago that the signals so slowed up traffic that the Yellow Cab Company got back the cost of the traffic towers the first day they were in operation. Of course this is not true, for the taxi meters run up faster on a distance basis than on a time basis if they have free running, and faster running was what was hoped for as the result of installing the towers.

This shifting of traffic to Wabash Avenue and State Street is now seriously interfering with the movement of street cars, particularly on Wabash, which is an exceptionally heavy rail route. This illustrates how vitally interested the railway company is in all traffic control measures. It is as competent as any one to judge of the suitableness of a proposed measure and it should be prepared to take the lead in a constructive effort to improve the situation generally.

A Constructive Talk to the Industry

RECURRING all through the interview with the new president of the American Electric Railway Association, published in this issue, are suggestions urging improvement of electric railway facilities and operation, and better methods of selling the service. Modernize and merchandise—these are his principal messages. They represent the two major opportunities of the electric lines today. Both are closely coupled, however, with the matter of building good will, which seems ever to be to the forefront in the mind of Mr. Budd in any consideration.

The railway that is doing things, he has found, is the one whose business is growing. That is borne out by experience the country over. The road that has "gone to seed" loses all attraction to people, who then ride only as necessity requires. On the other hand, with progressiveness and a true spirit of service in evidence, a railway can create new riding; that is, more rides per capita.

The interviewer's admonitions, in a plea for old-time enthusiasm in embracing and developing new kinds of service and new kinds of traffic, are well taken with respect to the spirit of many managements, though it has been encouraging to observe that there has been a notable change in some quarters during the past year. No doubt this more active interest will spread rapidly this next year and beyond as more and more roads show black figures on their balance sheets. Particularly is this true in view of the impetus that Mr. Budd's administration will give to these matters. It is to be regretted that there has not been greater courage and more aggressiveness in utilizing the improvements which have become available. These would have contributed materially to an earlier return of prosperity to roads that are still struggling along in red ink. As a matter of fact, the most readily available means of placing most roads on a satisfactory earnings basis is the extensive adoption of such modern practices as one-man operation, use of light-weight cars, automatic substations, and other economy measures.

Signs Should Explain Irregular Operation of Cars

FEW things annoy the average man more after waiting for a street car than to have the first one go by him without stopping. This annoyance is mitigated but little even when the destination sign is marked "Special" or "No Passengers." That there are sufficient other cars on the street to carry the passengers has no weight with the car-riding public. Neither does the contention that the following car will get the passenger to his destination almost as quickly as the first one would have. The mere fact that a car goes by him without stopping while he is waiting for transportation is cause enough for ill temper. This the railway should spare no reasonable pains to avoid.

There are several reasons why it may not be desirable to have a car carry passengers on a particular trip, as any transportation man knows. Frequently, however, investigation will show that more trips of this sort are run than necessity demands. A defective car that is bound for the carhouse should carry a sign with some such wording as "Car out of order" rather than a "special" sign, which carries vague meaning if any to the man on the street corner.

Cars pulling out of the carhouse or going back to it frequently can carry passengers to advantage on the way to or from their regular routes. But this calls for the use of some sign wording more meaningful than "Carhouse," "Barn," "House," etc. To have a sign of universal application would make this wording difficult, but in so far as cars are operated continuously from one carhouse, a single sign for them can be given some such wording as "Irving Carhouse via 10th St."

Even if it is the policy of the management to carry passengers on irregularly operated cars where possible, much follow-up work is necessary to see that the orders in this respect are enforced.

Safety Stops for the Railway or Common Sense for the Motorist?

AN IMPORTANT question is raised by the action of the New York State Bureau of Highways in asking that the Public Service Commission compel the cars of the Hudson Valley Railway to come to a full stop before crossing one of the state highways. The reason given for this request is that the automobiles crossing the intersection daily outnumber the interurban cars.

If no better argument than this can be advanced in behalf of the proposal, it hardly merits very serious consideration. The disastrous wreck on Dec. 9 of the Twentieth Century Limited, which resulted indirectly from an accident at another grade crossing in New York State, serves to emphasize the meaning of such a proposal as that made by the Highway Bureau. How ridiculous it would be to propose that one of the crack trains of the country be required to stop at every important grade crossing. That of course is the *reductio ad absurdum* of the bureau's proposal, but it falls within the same principle that the bureau would apply to the Hudson Valley Railway. Obviously the question is not a matter of the relative number of vehicles.

Grave doubts may well exist concerning the ultimate benefit in the direction of public safety which would follow the adoption of the policy sponsored by the New York State Highway Bureau. If one highway crossing is made a safety stop, why not every highway crossing? This would result in a situation intolerable and most unjust to railway passengers, and dangerous even for the motorists, for it would tend to make them more careless than at present. Their best safeguard is in their own caution. A special situation may exist to make desirable a safety stop at a particular point, but the mere fact that automobiles are more numerous than the electric railway cars is not a sufficient reason. This is said of course on the assumption that the railway has used every reasonable means of safeguarding its operation, which it must do in self-preservation.

It is believed the highway bureaus would do better to take steps to impress upon motorists the importance of observing the rudimentary precautions before crossing railroad tracks, either steam or electric. Coupled with some form of examination and registration of all drivers to eliminate those obviously unfit, the annual loss of life and limb due to the grade crossing could be reduced to a small fraction of what it is today, and accidents of the character of that of Dec. 9 could be eliminated entirely. Not only would this apply to grade crossing accidents, but the idea of greater care should reduce traffic accidents of all types.

New Type Committee Activity May Speed Modernization

THE recently formed committees of the American Electric Railway Association on city operation and interurban operation represent a distinct innovation in the methods of that body. In the past committees have had quite definite assignments, and have held strictly to their tasks. Here, however, are two committees whose function is to expedite modernization of railway operation by investigating first hand the advance practices of various companies and passing these on as suggestions to other companies. The field is so broad that only the most general instructions can be given in advance.

In general, the scheme of these committees is to have the entire country divided into seven regions, with a vice-chairman of each committee in each region. These men, who are really the key men of the entire plan, are to devote a portion of their time to visit and investigate the properties in their respective territories, with a view toward finding out what each property excels in that is applicable to other properties. This is to apply not only to the physical elements, but also to organization, publicity and public relations, and financing.

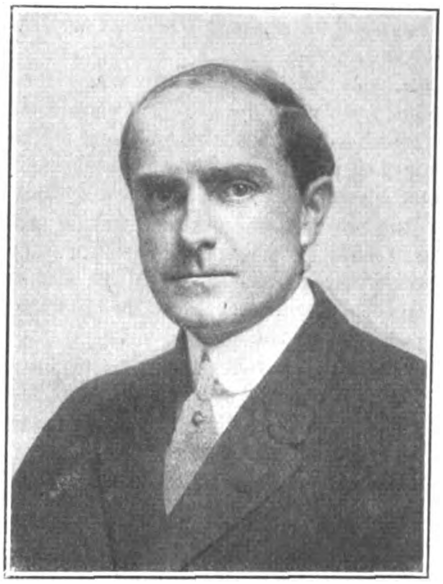
The possibilities from the work of these committees is very great indeed, the measure of accomplishment depending very largely on the interest, intelligence and time devoted to the work by the vice-chairmen. If they succeed in fulfilling the ideas of President Budd in creating the plan, they will appreciably speed up the modernization program throughout the industry.

There is no question that there is plenty of room for improvement in this direction. One trouble with the railways is their procrastination in adopting modern methods, even though it may be shown conclusively that they are advantageous. These committees can commend or criticise existing practices and thus perhaps stimulate managements to greater activity in putting their houses in order. But if the suggestions of the committees accomplish nothing in this direction, one thing is certain—the traveling vice-chairmen will themselves get a lot of good out of their work by virtue of taking time off their own jobs to study the practices and facilities of other companies.

Modernize and Merchandize

An interview with
Britton I. Budd
President
American Electric Railway Association

By Harry L. Brown
Editor Electric Railway Journal



Britton I. Budd

IF ONE wanted to follow the charted course for published interviews, Britton I. Budd, the new president of the American Electric Railway Association, would make an excellent subject. His personality and position would lend themselves to a colorful exposition of the traits and ideas which have enabled this self-made man to attain such great heights of responsibility. For Mr. Budd is as good a fellow and as interesting and capable a man, and has been entrusted with such responsibilities as would delight the literary genius looking for a story—a human interest story of a big man.

But further than to remind you that Mr. Budd is president of the Chicago, North Shore & Milwaukee Railroad, the Chicago Elevated Railroads and the Public Service Company of Northern Illinois, it is preferred here to omit all reference to those things which would reveal the character of the man and his pre-eminent fitness for leadership, appealing as they are, and devote the entire available space to the unadorned statements which express the views of the head of the electric railway industry on many of the more important problems confronting the railways today.

Suffice it to say that something of the personality of Mr. Budd, and some idea of the reasons why he occupies so prominent a position in the field, will be better appreciated after a reading of what follows. Submitting to my questioning, he has here contributed his views on the bus, on the general philosophy of selling transportation, on personnel training, modernizing equipment, especially interurban equipment, on publicity and advertising, on future rapid transit development, freight handling, results of one-man operation of modern cars, and so on.

The bus seems to be about the uppermost question in every electric railway man's mind these days, so I started in on that subject. The record of the interview follows:

THE BUS NOT A PROBLEM BUT A USEFUL TOOL

QUESTION: Do you consider that the bus is about the biggest new national problem confronting the electric railway industry?

MR. BUDD: I do not think that I would call it a problem. It seems to me it is an added feature of transportation that is going to be utilized by the electric railways.

QUESTION: To what extent do you think the industry will extend its present bus operations? Will it buy a good many more buses in the near future than it has in the past?

MR. BUDD: I think that the electric railways will find it to their advantage to use buses in a good many different fields. Of course, the amount of bus operation is going to increase very largely. The usefulness of the bus has been demonstrated and its use extended in so many different ways that I believe we can look for a very large increase in the number of passengers transported by means of buses. Furthermore, this is a development of the immediate future. It is right here at the moment.

QUESTION: Do you think the railways ought to go into the bus field with a downtown service, or merely connect up with existing rail lines at outside points?

MR. BUDD: It depends entirely upon the character of the city. If there are certain sections of the city where the territory is able to support it, there is no reason why there should not be a bus service delivering the people to the heart of the city, predicated of course on the streets having sufficient capacity and the bus service not contributing seriously to congestion.

QUESTION: Even though such operation might be competitive to a certain extent with existing rail lines?

MR. BUDD: Well, that of course is something that cannot be answered in an off-hand way. I can conceive that in certain areas of a city which might not be conveniently served by an electric railway a bus service could be utilized to good advantage.

QUESTION: To what extent do you think the motor bus can actually be made a monopoly? We speak of maintaining the monopoly of transportation, co-ordinating the service and keeping the bus in the hands of the railway people, but is the bus actually subject to monopoly? In other words, because of the small investment required to get into the bus business, by individuals, can it actually be made a monopoly?

MR. BUDD: It should be made a monopoly, because if it is not, it will be a most unprofitable thing to the individuals or companies who operate it, and the service will be unsatisfactory to the people. It should be co-ordinated with the other transportation facilities of the city and protected from competition. It would only produce chaos to have a lot of bus companies operating in one city.

QUESTION: In other words, it is partly a matter of protecting the bus against itself as well as the railway against the bus?

MR. BUDD: Absolutely. That was illustrated in London, where the Underground people have 5,600 buses. Through some mistaken notion on the part of the Parliament, a great many others were allowed to go into the bus business, and the inroads that they are making in taking the cream off certain routes have presented a serious problem to the big bus company and made what was a profitable venture almost a doubtful one. In other words, they are jeopardizing the main service supplied the people.

QUESTION: What further steps can be taken to emphasize the public need for co-ordinating all means of transportation and utilizing the existing traction corporations for the purpose?

MR. BUDD: Of course, I have no doubt that co-ordination of all transportation in the community would be the best from the standpoint of the cost to the rider, and it would also insure the municipality of meeting the demand for any kind of service, or any extension of service, because this one agency would be able to furnish whatever transportation was needed at any point in the community.

QUESTION: Then, what is your idea of the position the bus will occupy in transportation. Is the field for it largely in the outlying sections of cities and in interurban territory or in the congested sections of cities too?

MR. BUDD: Well, in the smaller communities it may be that bus service, assuming that a community has no service of any kind, will meet the needs and help the growth. Beyond this, necessarily the city ought to have electric railway service, and there the extensions that are needed from time to time can be first instituted by the bus until the territory will support the electric railway. There can also be feeder lines, or lines of a supplemental character where electric railway service will possibly never be supported. A bus can be operated at certain times of the day to serve certain needs and discontinued the balance of the day. It is flexible for serving a small number of people with infrequent service.

QUESTION: Is any railway company making any money on bus operation?

MR. BUDD: Why, I think there are instances where the bus is profitably operated by an electric railway. There are a good many considerations that enter into the matter, so that it is not to be judged purely on the basis of whether it is profitable. Take the case of a feeder to an electric railway, and it is pretty difficult to segregate the income that the railway will get for its portion of the haul and the business that is delivered to it which it probably would not otherwise get if it were not for the bus. Then there is the other feature, where buses are used for pioneer work. If the electric railway had to invest in tracks and facilities and wait for the territory to build up, that might be a very considerable factor. So, as I look at it, bus operation may or may not be profitable, but where the electric railway has need of it, it is a useful tool. It serves certain purposes due to the modern changed ideas of the people and also due to the fact that practically all communities in the country territory adjacent to cities are changing.

People are spreading out. They are getting farther and farther away from transportation. They do not regard it as necessary to be right close to existing transportation any more. The bus comes in to fill a need in connection with these new living habits. I know that is going on all around Chicago. People are locating out in the country considerable distances away from the existing means of transportation in locations that would not have been thought of five or ten years ago. Now, there will be no possibility of serving those people with a railroad, and yet they can be served with a bus and at such times and to such an extent as may be necessary. But as a general answer to your question, as a rule the bus operation by itself has probably not been profitable.

QUESTION: Do you think we are moving in the right direction by setting up the general policy of charging the same rate of fare on the bus that we do on the railway and issuing free transfers between the two?

MR. BUDD: No, I think that the bus operation should be made as nearly self-supporting as it can be. There may be exceptions to that rule, as for example where an extension is contemplated on the end of a railway line, and preparatory to that a bus line is put on. The company might be able to afford that bus service and give a transfer, which would be perfectly all right.

QUESTION: I would like to have your ideas about the advisability of publishing bus matter in ELECTRIC RAILWAY JOURNAL. Do you think we would be aiding the electric railway industry more now by discussing railway operation of buses in articles in the JOURNAL?

MR. BUDD: I have thought of that a good deal, and I am inclined to think that the time is getting around to the point where the ELECTRIC RAILWAY JOURNAL could incorporate bus features as part of the JOURNAL. I do not know whether the time is here now or whether it should be done in six months or nine months. But as soon as the electric railway industry gets to the point—and I think it has reached that point now—where it will utilize the bus to the extent that seems advisable and necessary, then the JOURNAL would be helping along the idea that it is an accepted practice of electric railways to utilize the bus. And it will be in the best interests of the industry when that idea is generally accepted. It was too bad it was not accepted, in my opinion, two or three years ago. I think it would have saved a lot of grief and trouble that we may be a long time in remedying.

THE OUTLOOK FOR THE CITY RAILWAY

QUESTION: What, in general, do you think is the future of the street railways with regard to increase or decrease of traffic?

MR. BUDD: I think the street railways will continue always to handle the mass of the people, and the increase of traffic will go on the same as in the past. I do not think there will be any effect upon the street railways by any bus operation. The street railways of this country, however, have got to deal with vehicular interference in congested portions of cities through some means of rapid transit or underground transit. That is not altogether their problem. It is the problem of the cities. The vehicular congestion due to the enormous increase in the number of automobiles is fast approaching the point where there is insufficient street capacity. Space off the streets has got to be found for parking these machines. The electric railway will have to find some solution of present congestion in order to make reasonable speed. Whether that will be done underground or overhead will depend on the community. It ought to be treated in such a manner that the expense will be borne by all the city, not alone by the company or the car rider, because the necessity for subway or elevated is simply a development that has come with modern conditions. The only other way to get more street capacity would be by materially widening the streets. This could be done, probably, in some communities, and in others it could not. But in any case it should not be done at the expense of the railway company.

New Traffic Can Be Created

I BELIEVE that it is possible to create new traffic. We fellows in the transportation game are very prone to think that the traffic available is only that where the rider is required to travel. We think when business is increasing that it must be due to the fact that everybody is employed, that the weather is fine, and all that. But back of all that is the question of whether the service is encouraging travel. I tell you, you can just as well increase the quantity of travel as you can increase the sale of some class of goods by proper merchandising and proper standards.

QUESTION: Is there any prospect of getting some measure of rapid transit service with street cars by giving them the right-of-way on the main routes, at least during the rush hours, and thus avoid the heavy investment required in subways?

MR. BUDD: That may be a possibility if there are enough entrances and exits to a business district so that some streets could be used exclusively for railway traffic. But in most cities, a good deal of the business is done through the medium of people driving around in automobiles, and to exclude them from certain streets would make it an impractical proposition because it would require people desiring to shop on that particular street to walk. Even then it might possibly be worked out.

QUESTION: You are convinced then, I take it, that there really is not much hope of having rapid transit systems unless the public does come in for a share in the investment?

MR. BUDD: No, because there is an enormous outlay, and there is no good reason why the property owners affected should not bear that expense. Due to the growth of motor vehicles and the height of buildings, the street capacity is no longer able to accommodate business. Consequently it becomes necessary really to build another street underground or overhead, and that is in the interests of the city; it is in the interests of facilitating business. If things go on indefinitely, nobody will be able to transact business. An automobile won't even be able to get to a place. A truck won't be able to deliver goods or take goods away. And the time element will be such that business can only be conducted at a tremendous loss. It will have the effect of driving business out into the less congested sections. There is no doubt but that will be one of the developments to come in the modern city. There are a lot of business concerns now doing business in the heart of the city where there is no need of it at all. They can just as well be 3 or 4 or 5 miles out. There is talk here in Chicago now of certain large concerns like insurance companies, moving out of the Loop district. Their business is largely conducted by mail. They have thousands of employees. They can get them right around in the neighborhood that they live in and get away from all of the congestion.

But still with all these developments there will be need of getting more street capacity. If it can be obtained by new streets, that is one way; if it can be obtained by wider streets, that is another way; if it can't be obtained by either one of these means, why then it is a question of going under ground or over head.

QUESTION: Is there any possibility of impressing the public with the necessity of so regulating vehicular traffic as to give the street railways more freedom in their operation?

MR. BUDD: A great deal can be done that way, by eliminating parking and by proper traffic regulations and by diverting as much traffic as possible from the streets on which the railway operates. There is no reason why that should not be done.

QUESTION: Mr. Budd, what do you think of the weekly pass as a seller of service and a creator of good will?

MR. BUDD: I think it is a fine, equitable means of affording low cost transportation to people who frequently use it. It is the only process that I know of in a city where with a fixed rate of fare you can give a wholesale rate for a wholesale use. That use is spread out; it is not confined to the rush hours, so it is not inequitable. There is no unfairness toward the other car riders by reason of it. It encourages a more frequent and greater use of railway service. By encouraging the use of transportation you are increasing the good will. Transportation is like anything else; it is a habit and it can be cultivated. We think the pass makes that possible.

In addition, it allows the interchange of business and occupation all over the community. It does not confine it to any one particular spot and therefore it is a good thing for the merchants. It is a good thing for the different parts of the community to have a free and easy means of intercommunication. It also allows merchants in one part of the city to feel that the people in another part of the city are easily accessible to them. The same way with entertainment houses, theaters, restaurants, stores, lodges—any kind of community activity that depends upon the attendance of people is benefited by the use of the pass. Therefore, the pass, making all this more readily possible, reacts favorably on the transportation company, and the people and stores and others who are benefited feel that the railway company is performing a very useful service in the community. Therefore, it engenders good will.

QUESTION: Are you satisfied it brings more money to the railway company?

MR. BUDD: I am. From my experience with the pass as applied here, I regard it as a very satisfactory method of selling transportation. We have no criticism to make of it at all. It has brought a great many people to use the service who might otherwise be using automobiles, which would cost them a great deal more money and a great deal more time.

The great problem of transportation in a large city is continually to increase the volume of business so that the unit cost can be reduced, and anything that tends to increase the riding habit will ultimately tend to lower the cost of performing the service. If you can lower the cost of the service and make it attractive, you can increase the volume, and volume is the desirable thing, because it means the greatest convenience to the public.

Rail Transportation Should Be Up to New Standards

THE American people, all said and done, will not be satisfied with anything but the best of service. They are willing to be liberal where that service satisfies them, and they like luxury. Standards of living have changed a great deal in the last five or six years and transportation ought to be changing with them. Consequently, I think that our track ought to be better maintained, our speed ought to be materially increased, and the exterior of our cars ought to be made attractive and the interior more luxurious. All this will tend to sell the thing that we have to sell, and that is transportation.

LOW FARE FOR SCHOOL CHILDREN BUILDS GOOD WILL

Just another thing in connection with that question of the rate of fare. I believe that the rate of fare for school children should be made just as low as it is possible to make it, to encourage the use of railway service by the young people. This should be done not only as a matter of performing a useful service to the community, but also to cultivate the good will of the parents. They will intrust their children to the railway company and feel that they are safely and carefully looked after by the crews.

Another element is that the good will and satisfaction of people in the communities is increased where they have large families. They want to take those children out, maybe in the evening to visit friends, maybe take them shopping, maybe to go to church, maybe to go to the parks and amusement places. Well, the parents of large families find it burdensome to take the children. They probably would not be very happy if they had to leave them at home on account of the expense of taking them along. Therefore, the low fare serves a very useful purpose there and makes friends. I do not know of any class of business that can be increased in a more substantial manner than in making it possible for the children to use transportation, and at the same time it means good will.

Now, on the North Shore Line, although we have increased our rate of fare a number of times, each time I have held firm on this question of the rate for school children. And I believe that this was one of the things that did much initially to make the people in that territory feel that we are the right sort and have the right ideas; whereas if the rate of fare for those children had been raised, we probably would have had every parent up in arms against us.

What does it mean to us? It is a little service that you perform of an auxiliary character compared to your regular services—the handling of those children at a small rate of fare and having all your crews give them special attention. Why, one of our trains coming down here in the morning is like a party, the conductors and the motormen looking after the children and calling them by name. Nothing is to be gained by the thought that you cannot carry school children except at a certain rate of fare. Whatever you obtain in income by an increase would be more than offset by ill will.

SEES EQUIPMENT DEVELOPMENT COMING

QUESTION: Mr. Budd, what can the manufacturers and the railways do to promote more rapid development of electric propulsion apparatus for railway service? I know that is a subject you are interested in.

MR. BUDD: Well, they probably could do a great deal, and they are doing a great deal. With the more prosperous condition of the electric railways I expect to see a great many developments in the next few years, not only in improved apparatus, more efficient and more economical apparatus, but also I expect to see marked improvements in car design. My own thought is that the electric railways, during the times of decreasing income and increasing expenses in the past years, have followed strictly a program of what was absolutely necessary to perform the service, eliminating everything that was in the nature of luxury or refinement. There they made an error, and a very considerable error, because the American people, all said and done, will not be satisfied with anything but the best of service. They are willing to be liberal where that service satisfies them, and they like luxury. Standards of living and the standards of thought have changed a great deal in the last five or six years and transportation ought to be changing with them. Consequently I think that our track ought to be better maintained, our speed ought to be increased where it is possible, and it is possible in most cases—it ought to be materially increased, and the exterior of our cars ought to be made attractive and the interior ought to be made more luxurious. All this will tend to sell the thing that we have to sell, and that is transportation.

QUESTION: You are thinking of city as well as interurban service in that, are you not?

MR. BUDD: Everything. To my mind we ought to be striving for innovations, changes, rather than simply sticking to something that seems to be an accepted practice, because whether we realize it or not, all our ideas have changed. Ten or twelve miles an hour won't satisfy us any more. We are irritated at the loss of time. The ordinary luxuries in travel that we thought were all right a few years ago are no longer acceptable to us.

We look with more or less scorn upon a tarnished or old fashioned car on the better through trains. We turn up our nose almost instantly. In a measure that is the reaction that the average rider gets when he sees the same stuff day in and day out, and there is never any change and never any innovation. So I think it is something that we can do constantly—strive for something in the way of improvements. The American people like to see changes. They like to see new ideas, and if they do see them, why they are keenly interested.

It has been a revelation to me on the North Shore to see what a lot of interest people really do take. Everything we do is of just as much interest to the people as to us. They talk about it, are enthusiastic about it, and act as though they themselves were personally interested. So monotony in any kind of business, I don't care what it is, is bad. The merchant who has the same window display every day in the year is going to lose your interest. You are going to go to the fellow who is giving you something in the way of a change, setting up new goods in the window, not the same old stuff. You have seen that and you have tried it and you know all about it, and there is no thrill in it. But the merchant who is changing his windows all the time is going to attract your business. The business of transportation is like anything else. People are not forced to use our method of transportation.

There are many instances that will illustrate that. We put observation cars on the North Shore. There is a very rich man who had never ridden on our line, though he had often seen it as he traveled up and down along side of it. But he hopped on one of those observation cars one day and rode to Lake Forest, and he said: "That is something like it. I have been hearing all these people talking about this electric road. I never could see anything in it, but now you have got something that appeals to me. I am for the electric and after this I am going to use it."

Well, now, you might question whether there is any money in those observation cars. I do not think there is. There are only twenty-six seats in them and we get fifty cents a seat—that is, $13 if we get them all filled, as against a coach with fifty-two passengers in it. You cannot figure out any money in that. But how much collateral good and how much drawing power has it? It is advertising our service and encouraging the use of it, the frequent use of it—so much so that we have ordered some more of these cars. We will have six trips out of each city every day with observation cars on the trains. If those are well patronized we will put on three more. If it is necessary in order to attract a certain amount of business to have an accommodation of that kind, why not furnish it? It is this volume from all sources that creates the business.

So, on this general idea of equipment, it seems to me we ought to tend toward more comfort, and depart from the plan we have had of just simply using whatever will last the longest, like wooden or slat seats, cane seats, and a certain type of frame, whether it is comfortable or uncomfortable, as long as it is a seat.

We know in the automobile business that a family will buy first a machine at $1,000 and then, because they want something more comfortable, something with a little more style to it, they will buy one for $2,400 and they will feel it is money well invested, and it tends to make life a little more pleasant and a little more worth living. Why isn't the same thing true of the railroad problem?

Take the example on the Elevated here of our getting a paint color for the exterior of the cars that would, when dirty, be just the color of dirt. That was the reason for our selecting that color years ago as it would require less cleaning. We totally excluded all idea of pleasing appearance, of getting a good reaction from our passengers, having them say, "Well, there is a nice looking vehicle. I am glad to ride in it." The only consideration was that it would cost less to clean that car and that the paint of that color being near dirt would last the longest without repainting.

Well, now that was undoubtedly the theory that a great many of us were working on, and that is a back number. It won't do. We have got to get the railway fellows to get away from that idea. We want speed—good looking exteriors and comfortable interiors, with speed. That is what the people want nowadays.

Get Something New—Monotony Is Bad

To my mind we ought to be striving for innovations, changes, rather than simply sticking to something that seems to be an accepted practice; because, whether we realize it or not, all our ideas have changed. Ten or twelve miles an hour won't satisfy us any more. Ordinary luxuries in travel, all right a few years ago, are no longer acceptable.

It has been a revelation to me on the North Shore Line to see what a lot of interest people really do take. Everything we do up there is of just as much interest to the people as to us. They talk about it, are enthusiastic about it, and they act as though they themselves were personally interested. So monotony in any kind of business, I don't care what it is, is bad.

FINANCING NEW WORK

QUESTION: In the matter of making improvements that show substantial economies or offer possibilities for increased earnings, isn't there usually some way to finance that work if the railway has the will to do it? We hear a good many railway companies, especially interurban railways, which recognize there are many directions in which they can economize and improve, always answer with the same thought—that they haven't any money.

MR. BUDD: Well, that is a pretty hard question to answer, but where they have obsolete equipment and equipment that is unsuited to modern conditions, heavy, unnecessarily large, extravagant in power consumption, extravagant in maintenance, still may have years of life, there ought to be some means found of replacing that equipment with modern equipment; if not all at once, gradually. The economies in many cases through the purchase of that new equipment would be so great that those companies ought to be able to buy it even if they did not have the money, because it could be easily shown to the manufacturer or banker that within a very few years the cost of it could be paid in lower operating expenses. Some of these interurban companies that are operating these great battleships, due to some preconceived notion that simply because it happened to be an interurban it had to be a car with a certain contour, a certain formidable appearance and weight and so forth, regardless of the service, all that class of cars the railway companies could well afford immediately to replace. I think they would find they would have the co-operation of the manufacturers in doing so.

I know of a case where equipment of that type could be replaced with modern equipment and the entire cost of it saved in operating expenses in five years. Some of this stuff we are now running is ridiculous.

QUESTION: Between car trust certificates, and employee and customer stock ownership, then, there ought to be some way to finance good improvements, don't you think?

MR. BUDD: Surely.

QUESTION: What are your ideas about this whole question of valuation and capitalization and relations between the two, and what ought to be done with the financial structure of many railways?

MR. BUDD: Well, I do not know. Of course it is very easy to say that the total securities should not exceed the value of the physical property. That is an ideal condition; and a further ideal condition to be aimed at is that the bonded debt should constitute less than 50 per cent of the total capitalization.

Some of these companies probably will have to be reorganized and their financial structure recast. Where that is possible it will of course put them on a much sounder financial basis, and when that is generally accomplished, will greatly improve credit and public relations.

QUESTION: On this matter of public relations and publicity, I wonder if you have any ideas of new ways to build sound public relations that might be tried by the utilities. What more can we do than at present?

MR. BUDD: What more can we do? Well, if every company was doing its utmost to give the best service it was capable of and its employees were actuated by an earnest desire to serve and to make friends, and if the facts and information about the company and its service and its problems were being disseminated continually year in and year out, if every company was liberally advertising year in and year out, if it was talking its problems before public bodies year in and year out, if it was seeing to it that every one, including the children in the schools, was informed, then I would say that maybe there was nothing more to do, except to do all that every year, year in and year out. But there are a lot of companies that are not doing a thing.

QUESTION: Then, Mr. Budd, you do not think there is any such thing as overdoing publicity, railroad publicity?

MR. BUDD: No, not if it is intelligently done. I do not think you can do too much of it, and I do not think that you can be too liberal in your appropriations for doing it, within reason, because an uninformed public not only reacts badly upon the credit and the business of the company, but it also has its reaction upon any constituted authorities, the commissions, the juries that try personal injury cases, the municipal authorities. These authorities may want to do the fair thing, but with an unfriendly atmosphere all around them, due to a lack of information, they are either neutral or their hands are tied for they reflect that unfriendly atmosphere, so that your whole structure depends upon it. And if you have to get capital from the people through some customer ownership plan, why your very life depends upon it. You cannot exist, because people who are not informed and are unfriendly certainly will not lend you their money to put into new equipment and plant; that is self-evident.

You have also got to have your employees informed and familiar with the company's affairs or they cannot possibly talk intelligently to the people they meet or their neighbors, and they cannot defend the company even though they may wish to. To inform your employees you must have your supervisory force informed.

QUESTION: Quite a number of railway men have asked me how much a railway ought to put aside as its appropriation for publicity work.

MR. BUDD: Well, generally speaking, I should say that for publicity and advertising they could safely put aside 1 per cent of their gross as a minimum.

RAILWAY FIELD AS OPPORTUNITY FOR YOUNG MEN

QUESTION: Mr. Budd, what can you say as to the opportunity the transportation industry now offers to young college men?

MR. BUDD: I think it offers a great opportunity. The problems of transportation in the big cities and in the country are, if anything, more interesting and call for greater skill and initiative than in the past. And with modern engineering and modern methods, these problems will test the mettle of our college men and afford them great opportunities, not only in connection with the electric railways as they exist and as they will develop, but in the extensive rapid transit development that is bound to come.

Rapid transit development during the next few years is going to be a very great factor because the trend of the population is toward the city, and that means, as the cities increase in area, greater speed will have to be reached in order to reduce the time involved in travel. So that there will be an intense development of rapid transit facilities in all large communities as main arteries to transport the people very considerable distances in a short space of time at a high speed. In addition to that, I believe that all of the steam railroads as they now exist in these big communities will be electrified and that to all intents and purposes they will become part of the rapid transit systems of the great cities. They may even be interconnected or co-ordinated with the local transportation systems in the communities.

Finally, all these various means of transportation, whatever they may be, steam railroads, rapid transit lines, street railway lines and bus lines, will be utilized to their fullest possible extent for the purpose of serving the people, because transportation in these areas of tremendous population is as essential as the sewer system, as the water system, as the power system. With rights-of-way difficult to obtain, costly, if not prohibitive, why the utilization of all existing means of transportation will have to be employed for the common purpose of serving the people with the necessary means of intercommunication. Transportation is going to be more and more a development and a problem due to this tremendous growth of cities, and therefore there ought to be opportunity for advancement and success of young men entering the business far greater than in the more or less pioneering days of the industry.

QUESTION: There seems to be a pretty well defined feeling among undergraduate student bodies that the opportunity to make money in the transportation field is less than in other lines of endeavor. What is the answer to that?

MR. BUDD: Of course, in the electric railway field it is probably true that there is usually less opportunity for individual ownership or part ownership of some railway enterprise, such as there might have been twenty or twenty-five years ago in the days of construction and promotion, where it might be possible for a young man either to have built or become a part owner in a property or some enterprise, but on the other hand those were very small undertakings. Today, these great enterprises must have the more skilled men in the technical and administrative ends, and there will always be a demand for them, and there will be liberal and generous salaries in order to attract those men who can meet these problems of engineering and management. But I believe that if, today, the salaries were examined in the electric railway industry they would compare favorably with salaries paid in any other industry in the country. The percentage of men in high executive positions who have not had the advantage of a college education, but have been technically trained and have natural ability, will also be found to compare favorably with the percentage in banking and other lines of business.

Low Children's Fare Builds Good Will

THE rate of fare for school children should be made just as low as it is possible to make it, to encourage the use of railway service by the young people. This should be done not only as a matter of performing a useful service to the community, but also to cultivate the good will of the parents. On the North Shore Line, although we have increased our rate of fare a number of times, each time I have held firm on this question of the rate for school children. And I believe that this was one of the things that did much initially to make the people in that territory feel that we are the right sort, and have the right ideas; whereas if the rate of fare for those children had been raised, we probably would have had every parent up in arms against us.

QUESTION: Then, if we really have a good opportunity for young men in the transportation business, what ought to be done to promote courses in public utility economics in the universities?

MR. BUDD: That should be actively instituted in every state in the Union, not only as a matter of getting the technically trained young men into the industry, but also men trained in the schools of commerce or business administration. There is just as much need in the business and financial and administrative side of the business as there is in the technical side, and the opportunities are just as great.

If utility courses were instituted in the universities it would be the means of educating the student body and the faculty and the administrative bodies of the universities in the needs and the problems of the electric railways, all of which would be most helpful to the industry and to the country. There ought to be an effort made in every state to see that public utilities or electric railway courses are included in the curriculum of every university and technical school. And the electric railways ought to interest themselves in a well-defined plan of taking graduates, a liberal number of graduates each year, into their service. They ought also to have some kind of instruction in their individual companies for the benefit of those men who have not had the opportunity to go to college. There are many men in the ranks who, with a little help through instruction and correspondence courses, can so improve themselves that they will of their natural ability make very desirable executives.

QUESTION: I would like to switch for a minute to the matter of wages. What do you think is going to be the wage situation in our industry in the next few years?

MR. BUDD: I do not believe that wages will materially recede from the present standards. There may be some decrease, but as a general thing I think the present standard of wage and living conditions and so forth are going to obtain in this country for an indefinite time.

QUESTION: That does not mean much prospect for lower fares, does it?

MR. BUDD: No, I do not think so. I do not think there will be any opportunity for that except possibly through an increased volume of business and relieving the car riders of some of the burdens of taxation and burdens of paving, and burdens of various kinds that are loaded upon them.

MODERNIZATION THE PRINCIPAL AID TO THE INTERURBANS

QUESTION: In general, Mr. Budd, what is the future of the interurban railways? They are the hardest pressed members of our industry now.

MR. BUDD: Well, to my mind, all these interurban roads of every kind and character, if there is any possible justification for it, ought to obtain modern, light, speedy equipment, and meet the changed conditions with like changes of cars, and obtain economical operation and speed.

Now, if they cannot compete with present conditions with those modern means, why, I do not know any other thing for them to do. You know that it is obvious that a good many interurban roads were unwisely projected with no economic reason for their construction. A little competition by the private automobile, taking away the margin above bare existence that did prevail, brings such lines to the point where they no longer can exist, but it does not change the fact that originally they should not have been built.

We hear a great deal about the abandonment of interurban roads, and that the abandonment is the sign that the automobile is going to supersede the electric railway. That is all fallacious reasoning. We see factories all over the country that at one time were in operation, but due to some changed condition or some reason or other they are vacant. Smoke is no longer coming out of the chimney and they are abandoned. Whatever their activity was, the time is past for it or the conditions are changed so that they can no longer operate. Well, that is the history of many different enterprises, and it has no significance whatsoever.

Public Relations a Continuing Task

WHAT more can we do? Well, if every company was doing its utmost to give the best service it was capable of, and its employees were actuated by an earnest desire to serve and to make friends, and if the facts and information about the company and its service and its problems were being disseminated continually year in and year out, if every company was liberally advertising year in and year out, if it was talking its problems before public bodies year in and year out, if it was seeing to it that every one, including the children in the schools, was informed, then I would say that maybe there was nothing more to do, except to do all that every year, year in and year out. But there are a lot of companies that are not doing a thing.

On interurban lines not having sufficient population tributary to them, it is possible that even with modern equipment and greater speed they would not be able to change the results.

So, as far as the interurbans are concerned, I do not think that, with modern equipment and aggressive business methods, and the use of the bus where it is necessary to use it, they are going to do anything other than improve, and in the course of time expand, if the territory they are operating in has the requisite population to support them.

QUESTION: You think that is true in spite of the competition of the private automobile, which is the most serious factor right now, I guess?

MR. BUDD: Yes. You must recollect that our span of view is kind of short. We are looking at three or five years in the past and maybe two or three years in the future, but this country is growing at a tremendous rate. What may seem a deplorable situation today, in three or four or five years from now will be an entirely changed situation. Cities are growing. Country districts are growing and the automobile is bringing population into the country. We are a great, growing country and we are going to need more and more transportation. We may possibly have periods when we seem to have too much of one kind or another, but in ten years we will wonder how we ever thought about getting along with what we have. We will have to have a whole lot more.

The automobile has done more than anything else to create the restless spirit in the people that keeps them moving all the time. People are not contented to sit at home all day Sunday and holidays like they used to be, and those who have automobiles use them, and those who have not accept auto rides when they can and use other forms of transportation. And then when the use of the automobile grows to such an extent that they cannot make time, they go back to the railroads.

QUESTION: Then do you figure that the building of good roads tends also to build up electric line traffic?

MR. BUDD: Indirectly, yes.

GOOD POSSIBILITIES IN FREIGHT

QUESTION: Should the interurbans go after freight and express business in a good strong way? Is this one of their best fields of endeavor?

MR. BUDD: If the electric railway is going to enter into the field of transporting merchandise it should seek to give this service in a better way, or a faster way than it can be done by any other means; in other words, give a superior service. The company should not go at it half-heartedly, and even if it is only done in a small way, the business should be handled more satisfactorily and more efficiently than it can be done by other carriers. Interurbans can do that by a little organizing and with equipment suited to whatever the necessities may be. But they cannot hope to make any money or build up any very considerable business unless they have the proper tools, equipment and facilities for conducting the business. If they can give this superior kind of service, they not only can do it profitably, even more profitably on a car-mile basis than the passenger business, but they can obtain good will, the friendship and support of the business men and the industries in their territory as well. The freight business is simply another means of giving greater service.

The greater the number of useful services that the interurban can perform, the better its prospects for profit. I think a great mistake of the electric railways in past years, particularly the interurbans, has been a sort of half-hearted, half-organized attempt at performing some kind of a service. Now, then, the thing to do is to get the service on a high plane, if you are going to do it at all, and not permit it to be simply a makeshift, a shiftless sort of an effort.

The merchandise business can be developed very rapidly. Of course, it will bring many problems with it, and as it grows there will be need for additional capital, especially in terminal facilities, which are difficult and costly to obtain. But this is one class of business you must have facilities to do business with or else the cost of operation will just simply exceed all possible income.

Freight is handled economically in proportion to the efficiency with which it is handled, and if the efficiency decreases, the costs mount in a greater ratio than the decrease in efficiency. It is a very peculiar thing. For instance, if a company has terminal facilities to handle 100 tons a day and it attempts to handle 200 tons a day, the rehandling, the delays and the losses mount with tremendous rapidity as the congestion increases. Under such conditions everything is handled probably two or three times over, and this cannot be done with any degree of satisfaction or economy.

QUESTION: What about pickup and delivery service?

MR. BUDD: Well, I have advocated at various times —we do not do it ourselves—that the electric railways keep out of the pickup and delivery business, because it usually cannot be included in the rate. If it is included in sufficient amount, the rate may be reduced from time to time so that this service will become a burden and possibly make the whole business difficult to conduct profitably. This subject is still an open question in my mind though. If a pickup and a delivery service were possible that would lessen the terminal investment, it might be a desirable thing, for terminal facilities run into vast amounts of capital that have to be constantly increased and you can hardly keep pace with the necessity for expansion.

Now, it seems to me that the problem of concentrating all this freight in terminal freight houses is something that ought to be minimized. It may be that collecting stations or receiving stations at different points convenient to the shippers might form an answer to the problem. From these points the railroad company could truck the stuff to its cars, having it sorted so that there would be little or no delay in loading into the proper cars.

But that whole problem of pickup and delivery and containers and terminal freight houses is such a complicated thing and differs so widely in different communities that I do not know how to express an opinion about it. Personally I am inclined to think that the steam railroads will have to come to some kind of receiving stations, and I do not see why the same thing is not applicable to some extent to interurban roads operating out of big communities, to which the freight will be delivered by the shipper and then the railway company will pick it up at the receiving station and take it to its cars, or its freight houses. That would get away from all this concentration of trucking coming to the freight house and the delay and expense to the shipper trying to get his trucks in and out.

QUESTION: We have not reached the limit by any means, have we, in the application of the one-man car in interurban service?

MR. BUDD: No, nor have we reached it in city service. I think that the one-man interurban and city car —light, small cars with frequent service and low operating costs—is the solution of many difficulties on the part of many companies. They have not realized this to the fullest extent.

We had an example of what the small cars will do in Milwaukee. Some of the fellows thought we were absolutely crazy to put one-man single-truck cars on that city service. We cut the interval between cars in half or better, and increased our gross 50 per cent.

And pleased! Those people up there are tickled to death to ride in those little cars with the plush seats; a great many are riding only a few blocks now.

Take it in Waukegan, a city of 20,000, where we had practically no riding on the old street cars. We had our six-minute rush-hour service and fifteen-minute headway the rest of the day and nobody rode. People did not think about riding. But now I venture to say that you cannot go up there at any hour of the day or any hour of the night up until midnight that you won't find those little cars with every seat taken. A person comes out of the house and they have only got to go four blocks maximum, and there is one of these little cars right in sight, and they simply jump aboard. There is a large amount of riding of four or five blocks in both these cities, showing that people can be induced to ride and make it a fixed habit and pleasure and convenience—a kind of rider we are not getting at all with old equipment. I do not see why there is not a tremendous opportunity for the railways in utilizing these little cars in frequent, fast service if there is any way to avoid duplicating equipment, where it is necessary on heavy routes to use big double-truck cars during the rush hours. The business is there for the frequent one-man operation. In the two places where we have tried it it has just increased the business exactly 50 per cent, and almost instantaneously. Those people must have been walking; I do not know where else the increase in patronage could have come from. They were there. The city has not changed its population. Our Waukegan lines never paid the interest on the investment in all of their twenty years. It commenced new and deteriorated and the track and the pavement and the reputation and everything else went to pieces—and today everybody is riding. I was up there last night and they were coming and going, every car filled, and all of them apparently happy. At least, they looked happy to me; I was happy.

We put a lot of new money into that property and bought a lot of new equipment, and it is earning, after charging about 4 per cent reserve for depreciation, a little better than 7 per cent on the total investment. It has not done that before in twenty years. It has barely paid operating expenses. That little city property ran about $250,000 last year and the population of Waukegan and North Chicago and the Naval Station is approximately 30,000. Over four million passengers in a city of 30,000 is pretty good riding—a riding habit of about 140.

Determine to Give a Superior Service

If the electric railway is going to enter the field of transporting merchandise it should seek to give this service in a better way than it can be done by any other means. Interurbans can do that by a little organizing and with suitable equipment. But they cannot hope to make any money or build up any considerable business unless they have the proper tools, equipment and facilities for conducting the business. If they can give this superior kind of service, they not only can do it profitably, even more profitably on a car-mile basis than the passenger business, but they can obtain the good will, friendship and support of the business men and the industries in their territory as well.

NEW TRAFFIC CAN BE CREATED

About that idea of increasing the business, I am convinced that it is possible to create new traffic. We hear a tremendous lot of talk about the North Shore line getting all the business and taking it away from the other carriers and all that sort of thing. If there were any way of analyzing it I believe it would be found that a very large percentage of the North Shore Line's business never existed prior to our giving this service. It was not there, and if our service were not there now, that riding would not be there. In other words, we have simply made it easy for people to travel, to visit and to do business. It is a natural thing, it is not unpleasant, it is not a fatiguing journey. Consequently, where a man might have taken a trip once in six months formerly, he now thinks nothing of taking it every week.

Now, we fellows in the transportation game are very prone to think that the only traffic available is that where the rider is required for some reason or other to travel, whether it is in the city or whether it is in the interurban field. I tell you, you can just as well increase the quantity of travel as you can increase the sales of some class of goods over here at Marshall Field's by proper merchandising and by proper standards. That is something we do not appreciate. We are inclined to think that when business is increasing it must be due to the fact that everybody is employed and that the weather is fine, and all that. But back of all that is the question of whether that service is encouraging travel. If it *is* encouraging travel, a natural momentum of increased travel is being built up all the time. That is a factor I think we could well pay a lot more attention to, because our people throughout the country do not appreciate that there is a great reservoir to draw from. They do not think of it in terms of possible business, and yet it is there. There is no question about it. The amount of travel tends to be cumulative. As the habit increases it tends again to increase.

I am always convinced of that right here in Chicago with our elevated system. If we had adequate track capacity here in the heart of the city and more express tracks in the outlying districts, I do not think there is any limit to the amount of business that we could get. The only limit would be the extent of our service and equipment.

Supposing you had a customer up in Racine or Kenosha and you were not particularly anxious to go up there because it was a tiresome journey. But on the other hand, that customer could be of help to you, maybe you could sell him more goods or maybe he could help you sell goods somewhere else. Now if it is easy to see him and it is to your profit to see him, you will see him easily twice as often, possibly three times as often as if it were an arduous, tiresome, time-consuming journey. Then, you would be likely to write him letters instead of jumping on the train and going up to see him. I think that is just exactly what has happened in our case.

The same situation exists with this merchandise service. We have a great many cases where men doing business in Chicago no longer keep any stock in Milwaukee. They ship right out of their Chicago stock and fill their daily orders. The same thing is true in Milwaukee. Merchants there ship from their Milwaukee stock to Chicago and do not keep any stock in Chicago because they can get daily delivery. And that seems also to stimulate a greater amount of travel because in a measure it would practically allow for the expense of at least a man's time traveling because it is unnecessary to keep a warehouse in the other city. We have a lot of that kind of business.

QUESTION: What is your motive for putting plush seats in the new cars of the elevated?

MR. BUDD: Well, it is just the idea that I was talking to you about of making the car a little more comfortable and a little more pleasing in the interior—electric fans and shaded lights and plush seats—all with the idea of really making a more comfortable conveyance. Our fellows differed very strongly on this seat proposal, but I am convinced it was the right thing. When we get some more cars next year I am going to put some more new things in. I do not know just what they will be, but I am convinced that they are business getters.

QUESTION: I wish we could spread a little of the optimism of your organization all over the country.

MR. BUDD: Well, you see we have had so many hard knocks that even the faintest kind of smile looks to us almost like sunshine. We have been brought up on adversity and these things make us cheerful.

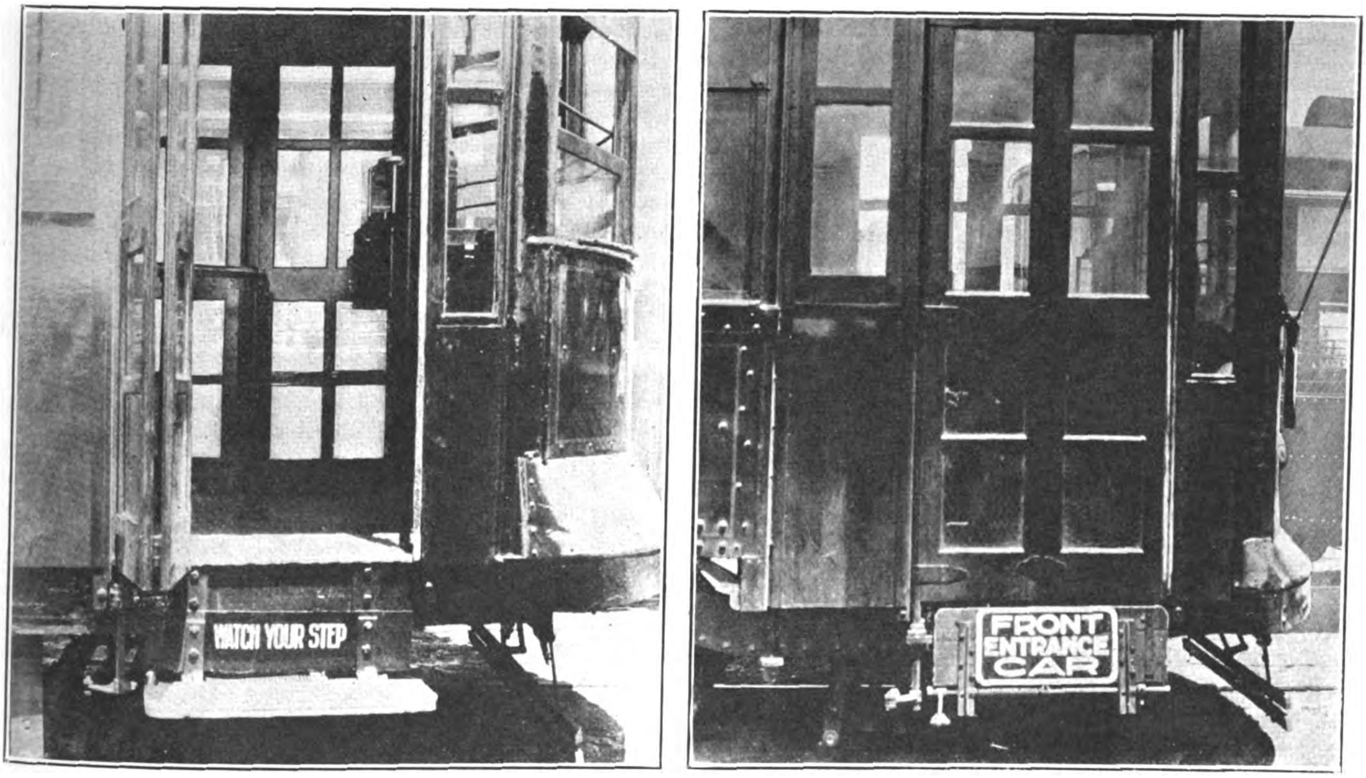
THE greater the number of useful services that the interurban can perform, the better its prospects for profit. I think a great mistake of the electric railways in past years, particularly the interurbans, has been a sort of half-hearted, half-organized attempt at performing some kind of a service. Now, then, the thing to do is to get the service on a high plane, if you are going to do it at all, and not permit it to be simply a makeshift, a shiftless sort of an effort.

Eliminating Half the Accidents in El Paso*

In Five Years the Cost of Accidents Was Reduced from 15.7 per Cent of Gross Earnings to 2.5 per Cent—Gold Stars for Trainmen with Clear Accident Records Encouraged Safe Operation—A Breakfast at 3 o'Clock in the Morning a Feature in the Campaign

NINETEEN months without a fatality, either in the street, on the cars or to employees, during which time the cars of the El Paso Electric Railway traveled 4,855,000 miles and carried 47,900,000 passengers, is the record of accomplishment under the leadership of Alba H. Warren, manager.

Accidents have decreased from 1,767 in 1921 to 1,401 in 1922 and, based on seven months' operation, to 940 in 1923. The best monthly record is for July, 1923, with only forty-nine accidents, compared with 109 for July last year and 147 two years ago.



Even the Car Step Risers Are Used to Direct Attention to Carefulness

The story probably begins with the inception of the "Honor Roll" and "Gold Star" plan, which were put into effect in October, 1919.

Every trainman who operates three months without an accident being charged against his record is given a day off on full pay. A committee, composed of an assistant claim agent, the assistant to the railway superintendent and the chief inspector, passes on each accident reported and if, in its opinion, the accident was one which could not reasonably have been avoided by the exercise of extraordinary care on the part of the operator, he is not charged with it. If, on the contrary, it appears that, even though he was not directly responsible, he could have avoided it by the use of extraordinary care, it is charged against his record.

One of the very beneficial features which the plan has brought out is that every operator is exceedingly anxious to be absolved from blame, and he not only runs his car with the greatest caution but, in the event of an accident, he does everything he can to secure all the witnesses and necessary data to exonerate himself. In a very considerable number of cases the injured party is asked to write a statement absolving the operator from blame. These statements, and the data secured by the trainman to exonerate himself, naturally are of great importance to the claim department and assist it in declining many claims which might otherwise have to be settled.

Inspectors, and all men in the operating department, are constantly striving to increase the number of men on the honor list, and the co-operation thus engendered has surpassed anything which had been hoped for. A man who stays on the honor list twelve consecutive months is given a gold star, which he wears on his sleeve, and receives an additional gold star for each succeeding twelve months during which he remains on the honor list. A soldier could not be much prouder of a medal of honor than are these men of their gold stars. There were in July, when this article was written, four men wearing three gold stars and likely to receive their fourth in October, and seven other three-star men; twenty-five men are wearing two stars and thirty-seven one star. Aside from the pride which the men have in them, these stars create a very favorable impression on the riding public. There has been no kick-back of any kind, and it is believed that eventually many companies will adopt some similar plan. From 85 per cent to 90 per cent of the trainmen secure a day off on full pay each month.

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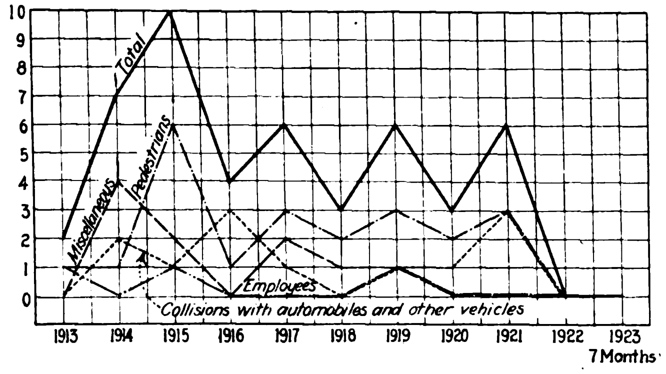
*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

This has not only had a tremendous effect on the reduction of accidents but has very materially increased the morale of the men. The cost is but a small proportion of the money saved, and the remarkable effects of the plan have been manifested in many ways aside from the actual reduction of accidents and the consequent cost. One of the local papers ran daily a picture of a gold star man, under the caption "Do You Ride With This Star Operator?" and under the picture was a brief history of the man and his work.



Fatalities Have Been Reduced to Zero from an Average of Five a Year by Means of the Safety Campaign

Bulletin Board Portrays Accident Records

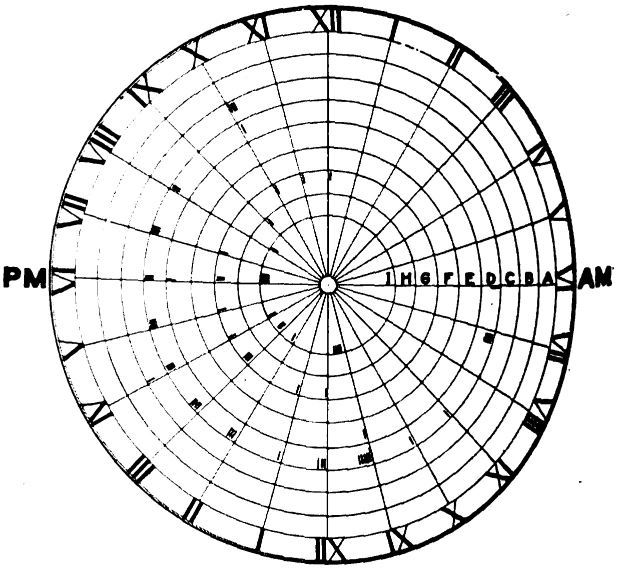
In addition to the monthly bulletins, which are posted showing the names of those on the honor list and the number of months which they have been on it, a very interesting board is kept which affords, in a permanent way, an accurate portrayal of the trainmen's accident records. A large board, incased in glass and illuminated by several electric lights, contains a chart for each trainman in service. On this chart the name of the trainman is given, the date that he entered service and the dates and kind of accidents which he has had. On the first day of the month these cards are all placed on a side of the board bearing the title "No Accidents This Month." As the month progresses and the trainmen report accidents, these cards are moved to the other side of the board under the title "Accidents This Month." These cards show all accidents reported, regardless of whether they are charged against the man's record or not, and also have affixed in one corner a tiny gold star for each year the trainman has worked without an accident being charged against him. The cards are all arranged alphabetically, and every trainman's accident record may be seen at a glance. This record, being kept constantly before the view of all trainmen, has a tendency to inculcate in them a desire to make a good showing before their fellow workmen.

As a result of the enthusiasm in accident prevention aroused in the men, they have held meetings of almost every description, groups from various departments, night men and day men, men from one line with men from another, line inspectors, dispatchers, and, in fact, almost every conceivable combination. Upon their own initiative line meetings are held by divisional inspectors, and the records of that particular line are gone over very carefully and the records of the individuals operating on it are checked up and discussed. An indifferent operator hasn't much chance of success among these men, and pressure is brought to bear on him by the men as well as by the officials.

In the early part of this year the night men challenged the day men to an accident contest covering a period of one month, the losers to pay for a banquet for the winners. The contest aroused a tremendous interest among the men, and the banquet, for which the night men had to pay, was one of the most successful affairs which had ever been held in connection with the company's business. Another contest was held and this time was won by the night men, and again a banquet was enjoyed by the winners.

A Breakfast at 3 O'Clock in the Morning Gets the Entire Organization Together

For a long time the company had tried to devise some plan whereby all of the trainmen could be got together at one time. Meetings, dinners and suppers had been given without number, but were always attended either by the night force or the day force, but never by both in a body. The two contests above mentioned furnished an idea. Mr. Warren, the manager, told the men that instead of their working against each other, he would suggest a contest between the men as a whole and the company, and he proposed that if they could go through the month of April without exceeding ninety accidents, he would give the entire organization a breakfast at 3 o'clock in the morning. The scheme met with instant and enthusiastic reception, and the men set to work with greater zest than they had ever before shown. Every accident reported during the month was scrutinized by almost every man in the organization, and the offender was made to feel the severe displeasure of his more fortunate brothers. The daily newspapers carried articles giving the number of accidents to date, and there was a very general interest in the contest manifested throughout the city. The Automobile Club asked its members to be unusually careful in order to help the trainmen win. School teachers cautioned their pupils and industrial plants cautioned their men. After



The "Accident Clock" Was Used to Indicate for a Month the Hours at Which Various Types of Accidents Occurred

a contest, almost as exciting and interesting as that occasioned by baseball teams for the world's championship, the men won with a score of 89, just one within the mark set.

The banquet was attended by the Mayor and Aldermen of the city of El Paso, the Mayor's representatives the Aldermen from the city of Juarez, Mexico; United States and Mexican customs and immigration officials, the Chief of Police, the City Treasurer and countless newspaper men and public spirited citizens, and finally, a Major-General of the United States Army. Beforehand it was feared that on account of the hour the program would drag, and it was, therefore, made as brief as possible, with the idea that the breakfast, which actually started at 2 o'clock, would end at a quarter to four. Instead the breakfast lasted until 5 o'clock without any slowing down whatever of the program, and in fact ended all too soon for every one present. Incidentally, trainmen who had been unfortunate enough to have accidents during the month served as waiters.

OTHER SAFETY MEASURES

The honor system has not alone been responsible for this splendid climax of the safety program. Throughout the entire organization every department has brought its best thought to bear on the accident situation, and nothing has been overlooked from the mechanical end and from the standpoint of public co-operation which could assist in carrying out the work. Dashboard signs and posters carry warnings to the public about certain types of accidents, beseeching them to be careful, and at other times pointing out the desirability of the service.

Inspectors make daily checks of cars on the line and impress on trainmen the necessity of caution at all times. They ride with the men during quiet hours, instructing them in making easy stops and starts, how to handle accidents if they happen, how to secure signed statements, etc.

A large personal record book furnishes invaluable assistance in following the work of the trainmen and in affording accurate information as to the individual's capability. Each trainman has a page in the book, and on this page an accurate record is kept of all matters pertaining to his work, the number and kind of accidents, the number and kind of violations, complaints on the part of his passengers, from his passengers, etc. The superintendent may, by going through this record book, tell at a glance the men whose work is below par, and he is able to detect very quickly men who have been reported or cautioned for careless operation. On the theory that a habitually careless man is, in the very nature of things, bound to have serious accidents sooner or later, men who the records show are not operating as they should are, after having been properly instructed and cautioned, dismissed from the service. This is a much better plan than locking the door after the pony has escaped and has been a considerable factor in assisting in avoiding preventable accidents.

Charts are constantly kept before the trainmen showing them the kind and number of accidents which occur each day, giving comparisons with previous months and previous years, and in addition to this a large stand, supplied with pads of paper the size of a double newspaper page, is used to make special pleas to the men, or to call certain matters definitely and forcibly to their attention. Colored crayon is used in writing notices on this stand.

In the clubroom and carhouses, in the shops and in several other places there are "Safety First" suggestion boxes with blank cards in a box beside them. On the face of each box is a statement to the effect that many possible improvements in the company's practice occur to the men before they are discovered by the management, and that each employee who thinks of something that might better the service or eliminate an accident hazard should convey the thought to the management through these cards. A surprising number of valuable suggestions are made and adopted.

In the superintendent's office a large backed map of the city is used to show the kind and location of accidents. Pins of various colors show derailments, trolley breaks, collisions with automobiles, collisions with other vehicles and collisions between cars. This map is of considerable value in locating places where particular types of accidents are occurring, with the result that immediate efforts may be brought to bear to correct the condition. This map is cleaned off and started anew on the first of each month, and at the end of the month a permanent record is made from it. In addition to the map, an accident clock is used, on which the hour in which accidents occurred is designated. This, too, is a monthly record.

Do You Ride With This Star Operator?

A Feature of the Newspaper Publicity Was a Series of Portraits Like This

In case of an accident the divisional inspector is notified at the same time that the attention of the claim department is brought to it, and because of his proximity to the scene of the accident he is frequently on hand and secures valuable information prior to the arrival of the investigator. The report which he makes oftentimes covers information which would otherwise not be obtained.

Various warning signs, including those prepared by the American Electric Railway Association, have been used with good results. When the operator opens his door to take on passengers the step is lowered and a sign bearing the words "Watch Your Step" shows up on the body of the car just above the step, but it is not visible when the door is closed and the step raised up.

The public generally pays very little heed to such signs as "Do Not Talk to the Motorman." It was felt very necessary in the safety campaign to eliminate this practice as far as possible, and a small placard was designed which was placed in the vestibules of cars on the reverse side of the route sign boxes. This sign is worded as follows:

"Please stand back far enough not to obstruct the motorman's view. His failure to see might cause a serious accident.

"The motorman will cheerfully give you all necessary information, but please do not engage him in unnecessary conversation, thereby distracting his attention from his work."

The consent of the superintendent of public schools has been secured to introduce safety as a regular part of the curriculum of all public schools throughout the city. Beginning with the September term, a talk on safety will be made each week by every teacher in each school. In addition to this, members of the company's organization and representatives of the Automobile Club will make talks about once a month. The Automobile Club and the daily newspapers also put on a "Safety First" week. The July record of only forty-nine accidents was in part due to the "Safety Week" sponsored by the El Paso *Herald*. Other similar campaigns for civic safety are also being worked out.

In answer to the question as to whether these things have really been worth while, the following figures can be quoted:

TOTAL COST OF CLAIM DEPARTMENT, SETTLEMENTS, FIXED CHARGES, ETC.

Year	Total Amount	Per Cent of Gross Earnings
1919	$111,000	15.7
1920	71,000	7.7
1921	61,000	6.3
1922	31,000	3.5
1923	23,000	2.5*

*Based on seven months' operation.

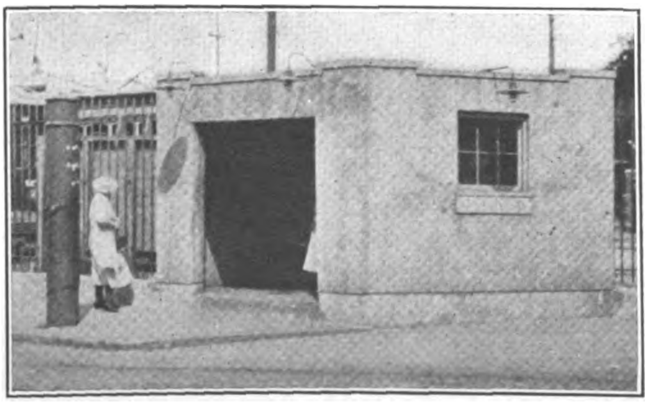
This means a reduction of from 15.7 per cent to 2.5 per cent of the gross earnings. The figures given include all the expense incident to the operation of the claim department, as well as all settlements, and a feature of the situation is that the total outstanding liability is estimated at only $2,000.

Railway Has Ample Supply of Free Coal

A UNIQUE feature of electric railway operation in the Susquehanna Valley of Pennsylvania is the fact that free coal is available to all. The Susquehanna River flows down from the anthracite mining district and carries with it large quantities of fine hard coal. This material collects at various points along the course of the river and is reclaimed by the use of suction dredges. The Harrisburg Railways avails itself of this supply of free coal and the only expense is that of dredging and hauling to the power house.

Convenient Waiting Station

A SHORT time ago the Boston Elevated Railway had occasion to reconstruct its Park Street division headquarters in Dorchester. At the corner of the lot is a busy transfer point, and the management arranged to install a small but very convenient waiting station for passengers. It is of reinforced concrete one story high and without doors.



Convenient Waiting Station of Boston Elevated Railway on Park Street

Company Helps Employees Buy Homes*

Legal and Financial Aid Afforded—More than 75 per Cent of the Employees Take Advantage of the Opportunity

BUILDING and loan associations organized primarily for the benefit of the employees of an electric railway company are so rare that they are worth mentioning. The Colorado Springs & Interurban Railway has made arrangements with the financial interests connected with that company by which it has been able to assist its employees in buying homes. The plan is very simple and is as follows:

The employee selects his home in any part of the city that he may desire, without any dictation or suggestion of any kind from the company, except that the price paid shall not be in excess of that which the company deems to be a fair price. The company's attorneys examine the abstract of title without charge to the employee. The property is then purchased for cash, the employee paying 10 per cent on the purchase price or as much more as he may desire, and the company paying the rest. The contract between the company and employee requires that the latter shall refund his loan from the company at the rate of $1 a month for each $100 of the principal of the loan, and that he will pay interest at the rate of 5 per cent per annum on the monthly balance, the employee having the right to pay as much more on the principal as he may desire at any time. The contract further provides that payments will be suspended during sickness. If the employee leaves the service of the company, either voluntarily or involuntarily, he may carry on the contract the same as if he had remained in the service.

MANY EMPLOYEES PURCHASE HOMES

There are about 185 regular employees of the company and 145 contracts have been issued. Approximately $265,000 has already been loaned by the company and approximately $130,000 has been repaid on the principal. No contract has been forfeited, as no employee has failed to comply with the contract. Over 50 per cent of the employees have paid in more than the contract called for.

Some time ago the company took out a group life insurance policy for its employees with a large life insurance company, covering the lives of all its employees in the sum of $1,000 each. The premiums on this policy are wholly paid by the company, and it has been found a great aid to the widow of an employee in caring for any unpaid balance that there may have been on the home contract at the time of the husband's death.

As shown by the large number of employees who have taken advantage of this plan, it is considered a desirable one by them. The company considers itself benefited because it believes that a home-owning employee is apt to be more reliable and careful than one who is not such a property holder. The plan has also tended to create favorable public sentiment, because the public looks with favor upon every plan which results in an increase in the number of home owners and taxpayers in the community.

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*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

Traffic Increasing in Populous States

Census Figures for Eight More States and the District of Columbia Show that More Passengers Were Carried in 1922 than in 1917 in Every Case Except Ohio—California Leads with 46.5 per Cent Increase

THE healthy condition of the electric railway industry in the more important states is shown by the figures recently released by the Bureau of the Census. Earlier figures for sparsely settled states showed slight decreases in passenger traffic in several cases, but in the more thickly populated districts the passengers carried in 1922 was substantially greater than in 1917.

Georgia—The figures show a slight decrease in track mileage while passenger traffic increased by 14.6 per cent in 1922 as compared with 1917. Gross railway operating revenues aggregated $7,703,960, an increase of 52.2 per cent and net income from all sources made a gain of 106.4 per cent.

	1922	1917	Per Cent of Increase, 1917-1922
Number of operating companies....	¶11	13	....
Miles of single track operated §....	468.66	473.31	*1.0
Number of cars, all types..........	824	777	6.0
Number of electric locomotives....	1	1	....
Number of persons employed......	4,177	3,669	13.8
Salaries and wages..............	$5,223,143	$2,838,349	84.0
Primary horsepower, total........	213,295	201,243	6.0
Kilowatt capacity of generators....	139,620	129,282	8.0
Current generated, kilowatt-hours	376,846,155	319,184,303	18.1
Current purchased, kilowatt-hours	71,458,016	45,506,100	57.0
Passengers carried..............	**130,718,221	114,021,766	14.6
Revenue car mileage............	22,619,406	20,907,644	8.2
Railway operations, revenue.......	$7,703,960	$5,060,481	52.2
Railway operations, expenses......	$5,777,707	$2,915,480	98.2
Net revenue, railway operations...	$1,926,253	$2,145,001	*10.2
Auxiliary operations, revenues ‡...	$11,303,937	$5,086,031	122.3
Auxiliary operations, expenses.....	$6,334,920	$2,572,419	146.3
Net revenues, auxiliary operations	$4,969,017	$2,513,612	97.7
Net operating revenues...........	$6,895,270	$4,658,613	48.0
Taxes assignable to railway operations..................	$1,265,217	$708,769	78.5
Operating income................	$5,630,053	$3,949,844	42.5
Non-operating income............	$488,806	$338,601	44.4
Gross income..................	$6,118,859	$4,288,445	42.7
Interest and other deductions from gross income.............	$3,963,152	$3,244,265	22.2
Net income....................	$2,155,707	$1,044,180	106.4

* Denotes decrease.

‡ Chiefly revenues from electric light and power departments of electric railways.

¶ Two companies with 7.82 miles of track which reported in 1917 discontinued operations prior to 1922.

§ Includes 27.32 miles in 1922, and 33.91 miles in 1917 lying outside of the state, but owned by companies within the state, and excludes 8 miles in 1922 and 10.29 miles in 1917 operated in the state but owned by companies outside the state.

** In addition there were 8,000 passengers carried by two motor buses operated by electric railway companies.

Ohio—The figures show a decrease of 6.8 per cent in track mileage accompanied by a decrease of 6.5 per cent in the number of passengers carried. Gross railway operating revenues amounted to $62,329,336 in 1922, an increase of 31.6 per cent as compared with 1917; operating expenses increased 42 per cent and net income made a gain of 18.9 per cent.

	1922	1917	Per Cent of Increase, 1917-1922
Number of operating companies....	†71	74	....
Miles of single track operated¶...	4,008.50	4,299.18	*6.8
Number of cars, all types..........	6,165	7,041	*12.4
Number of electric locomotives....	18	20	....
Number of persons employed......	22,265	22,853	*2.6
Salaries and wages..............	$29,904,803	$19,824,059	50.9
Primary horsepower, total	393,296	518,482	*24.1
Kilowatt capacity of generators....	281,371	338,041	*16.8
Current generated, kilowatt-hours	623,119,915	1,005,108,892	*38.0
Current purchased, kilowatt-hours	434,535,837	190,291,931	128.4
Passengers carried..............	§ 966,725,637	1,034,245,928	*6.5
Revenue car mileage............	141,247,669	153,468,636	*8.0
Railway operations, revenues......	$62,329,336	$47,369,242	31.6
Railway operations, expenses	$47,253,403	$33,281,662	42.0
Net revenues, railway operations...	$15,075,933	$14,087,580	7.0
Auxiliary operations, revenues.....	‡ $10,388,877	$10,439,915	*0.5
Auxiliary operations, expenses....	$5,299,987	$6,881,791	*23.0
Net revenues, auxiliary operations	$5,088,890	$3,558,124	43.0
Net operating revenues...........	$20,164,823	$17,645,704	14.3
Taxes assignable to railway operations..................	$5,480,235	$3,625,427	51.2
Operating income................	$14,684,588	$14,020,277	4.7
Non-operating income............	$1,939,488	$1,091,873	77.6
Gross income..................	$16,624,076	$15,112,150	10.0
Interest and other deductions from gross income.............	$10,738,532	$10,160,860	5.7
Net income....................	$5,885,544	$4,951,290	18.9

* Denotes decrease.

† Reduction due to mergers and to companies which have discontinued operations.

‡ Chiefly revenues from electric light and powet departments of electric railways.

¶ Includes 123.40 miles of track in 1922 and 136.57 miles in 1917 lying outside the state, but owned by companies within the state, and excludes 93.03 miles in 1922 and 73.50 miles in 1917 operated in the state, but owned by companies outside the state.

§ In addition there were 2,637,352 passengers carried by fifty-two motor buses operated by electric railway companies.

Illinois—The figures show a slight decrease in track mileage and an increase of 5.3 per cent in the number of passengers carried. Gross railway operating revenues amounted to $100,762,053 in 1922, an increase of 57.6 per cent as compared with 1917; operating expenses increased 91.7 per cent and net income made a gain of 34.5 per cent.

	1922	1917	Per Cent of Increase, 1917-1922
Number of operating companies....	†70	75	....
Miles of single track operated¶....	3,458.50	3,478.47	*0.6
Number of cars, all types..........	9,496	9,510	*0.1
Number of electric locomotives....	38	29	....
Number of persons employed......	28,429	24,229	17.3
Salaries and wages..............	$50,599,171	$23,977,886	111.0
Primary horsepower, total........	189,809	147,722	28.5
Kilowatt capacity of generators....	150,785	103,475	45.7
Current generated, kilowatt-hours	324,376,010	256,981,900	26.2
Current purchased, kilowatt-hours	923,817,630	940,766,524	*1.8
Passengers carried..............	**1,753,500,547	1,665,552,944	5.3
Revenue car mileage............	230,126,979	225,444,667	2.1
Railway operations, revenues......	$100,762,053	$63,953,123	57.6
Railway operations, expenses......	$71,558,177	$37,322,057	91.7
Net revenues, railway operations...	$29,203,876	$26,631,066	9.7
Auxiliary operations, revenues ‡...	$5,974,979	$2,560,711	133.3
Auxiliary operations, expenses.....	$3,730,279	$1,426,292	161.5
Net revenues, auxiliary operations	$2,244,700	$1,134,419	97.9
Net operating revenues	$31,448,576	$27,765,485	13.3
Taxes assignable to railway operations..................	$6,074,306	$5,252,745	15.6
Operating income................	$25,374,270	$22,512,740	12.7
Non-operating income............	$2,232,793	$1,694,417	31.8
Gross income..................	$27,607,063	$24,207,157	14.0
Interest and other deductions from gross income.............	$16,350,221	$15,835,140	3.3
Net income....................	$11,256,842	$8,372,017	34.5

* Denotes decrease.

† Reduction due to mergers and to companies which have discontinued operations.

‡ Chiefly revenues from electric light and power departments of electric railways.

¶ Includes 91.96 miles in 1922 and 85.96 miles in 1917 lying outside the state, but owned by companies within the state, and excludes 47.61 miles in 1922 and 48.92 miles in 1917 operated in the state, but owned by companies outside the state.

** In addition there were 509,284 passengers carried by twelve motor buses operated by electric railway companies.

Maryland and the District of Columbia.—The figures show a slight decrease in track mileage and an increase of 11.5 per cent in the number of passengers carried. Gross railway operating revenues amounted to $32,579,193 in 1922, an increase of 61.9 per cent as compared with 1917; operating expenses increased 90.2 per cent and net income made a gain of 30 per cent.

	1922	1917	Per Cent of Increase, 1917-1922†
Number of operating companies....	19	19	......
Miles of single track operated**.....	1,041.28	1,059.55	— 1.7
Number of cars, all types..........	3,755	3,817	— 1.6
Number of electric locomotives.....	5	7	......
Number of persons employed.......	10,686	9,431	13.3
Salaries and wages..............	$15,123,861	$7,625,059	98.3
Primary horsepower, total.........	77,265	118,353	—34.7
Kilowatt capacity of generators.....	59,305	77,592	—23.6
Current generated, kilowatt-hours..	138,663,405	125,412,872	10.6
Current purchased, kilowatt-hours..	287,584,529	209,525,220	37.3
Passengers carried...............	††573,331,094	514,063,743	11.5
Revenue car mileage.............	67,320,143	62,989,623	6.9
Railway operations, revenues.......	$32,579,193	$20,119,262	61.9
Railway operations, expenses.......	$22,323,750	$11,735,843	90.2
Net revenues, railway operations....	$10,255,443	$8,383,419	22.3
Auxiliary operations, revenues§.....	$2,899,897	$1,170,588	147.7
Auxiliary operations, expenses....	$1,490,230	$760,736	95.9

	1922	1917	Per Cent of Increase 1917–1922'
Net revenues, auxiliary operations..	$1,409,667	$409,852	243.9
Net operating revenues............	$11,665,110	$8,793,271	32.7
Taxes assignable to railway operations......................	$2,886,332	$1,695,551	70.2
Operating income................	$8,778,778	$7,097,720	23.7
Non-operating income............	$1,490,884	$1,293,047	15.3
Gross income..................	$10,269,662	$8,390,767	22.4
Interest and other deductions from gross income.................	$6,617,918	$5,580,887	18.6
Net income.....................	$3,651,744	$2,809,880	30.0

* Denotes decrease: percentages not shown where base is less.

** Includes 4.70 miles in 1922 and 1917 lying outside this area, but owned by companies within this area, and excludes 26.24 miles in 1922 and 16.59 miles in 1917 operated in this area, but owned by companies outside this area.

†† In addition there were 294,013 passengers carried by nine motor buses operated by electric railway companies.

§ Chiefly revenues from electric light and power departments of electric railways.

Pennsylvania—The figures show a slight increase in track mileage and an increase of 9.7 per cent in the number of passengers carried. Gross railway operating revenues amounted to $102,077,951, an increase of 44.4 per cent as compared with 1917; operating expenses increased 72.2 per cent and net income made a gain of 10.3 per cent.

	1922	1917	Per Cent of Increase, 1917-1922
Number of operating companies...	†117	119	*1.7
Miles of single track operation¶....	4,326.74	4,324.41	0.1
Number of cars, all types..........	8,626	9,267	*6.9
Number of electric locomotives....	7	5	....
Number of persons employed......	30,570	28,557	7.0
Salaries and wages..............	$46,714,521	$25,142,481	85.8
Primary horsepower, total	238,078	250,483	*5.0
Kilowatt capacity of generators....	164,718	165,078	*0.2
Current generated, kilowatt-hours	281,472,485	395,393,553	*28.8
Current purchased, kilowatt-hours	726,998,081	573,562,988	26.6
Passengers carried...............	1,667,889,553	1,520,378,517	9.7
Revenue car mileage.............	199,222,010	204,627,827	*2.6
Railway operations, revenues......	$102,077,951	$70,673,008	44.4
Railway operations, expenses......	$74,058,711	$42,998,469	72.2
Net revenues, railway operations...	$28,019,240	$27,674,539	1.2
Auxiliary operations, revenues ‡...	$2,156,004	$881,779	144.5
Auxiliary operations, expenses.....	$1,434,807	$523,772	173.9
Net revenues, auxiliary operations..	$721,197	$358,007	101.4
Net operating revenues...........	$28,740,437	$28,032,546	2.5
Taxes assignable to railway operations......................	$4,976,665	$3,256,235	52.8
Operating income................	$23,763,772	$24,776,311	*4.1
Non-operating income............	$4,336,789	$3,670,219	18.2
Gross income..................	$28,100,561	$28,446,530	*1.2
Interest and other deductions from gross income.................	$21,502,058	$22,464,591	*4.3
Net income.....................	$6,598,503	$5,981,939	10.3

* Denotes decrease.

† Reduction due to mergers and to companies which have discontinued operations.

‡ Chiefly revenues from electric light and power departments of electric railways.

¶ Included 31.79 miles in 1922 and 29.22 miles in 1917 lying outside the state, but owned by companies within the state, and excludes 149.90 miles in 1922 and 166.92 miles in 1917 operated in the state, but owned by companies outside the state.

California—The figures show a slight increase in track mileage and an increase of 46.5 per cent in the number of passengers carried. Gross railway operating revenues amounted to $57,759,996 in 1922, an increase of 70 per cent as compared with 1917. Operating expenses increased 69.8 per cent during the 5-year period and net income aggregated $2,293,934 in 1922 as compared with a deficit of $3,823,179 in 1917.

	1922	1917	Per Cent of Increase, 1917-1922
Number of operating companies...	†29	32	....
Miles of single track operated......	3,053.07	3,022.08	1.0
Number of cars, all types..........	6,016	5,542	8.6
Number of electric locomotives....	76	78	....
Number of persons employed......	18,794	15,977	17.6
Salaries and wages..............	$28,717,870	$16,217,815	77.1
Primary horsepower, total ¶......	7,000	48,070	*85.4
Kilowatt capacity of generators ¶..	6,500	30,200	*78.5
Current generated, kilowatt-hours	....	12,248,329	....
Current purchased, kilowatt-hours	584,020,073	500,094,869	16.8
Passengers carried...............	**935,446,247	638,632,142	46.5
Revenue car mileage.............	138,527,994	130,402,420	6.2
Railway operations, revenues......	$57,759,996	$33,982,748	70.0
Railway operations, expenses......	$43,436,899	$25,582,252	69.8
Net operating revenues...........	$14,323,097	$8,400,496	70.5
Taxes assignable to railway operations......................	$3,331,280	$2,072,814	60.7
Operating income................	$10,991,817	$6,327,682	73.7
Non-operating income............	$677,638	$436,951	55.1
Gross income..................	$11,669,455	$6,764,633	72.5
Interest and other deductions from gross income.................	$9,375,521	$10,587,812	*11.4
Net income.....................	$2,293,934	*$3,823,179*	....

* Denotes decrease.

† Reduction due to mergers and to companies which have discontinued operations.

¶ All generating equipment reported in 1922 was idle, and in 1917 the greater part of the power equipment reported was not in operation.

** In addition there were 2,826,815 passengers carried by fifty-five motor buses operated by electric railway companies.

Louisiana—The comparison of 1922 operations with those of 1917 are influenced to a considerable extent by the fact that in 1922 one of the largest companies in the state furnished a combined report covering both its railway and electric light and power departments, while in 1917 separate returns were secured and the data relating to the production and sale of electric current were included in the special report on this subject and not in the statistics relating to railway operations. This change in method of reporting is due primarily to a reorganization of the company in question.

The figures show a decrease of 7.8 per cent in track mileage and an increase of 22.8 per cent in the number of passengers carried. Gross railway operating revenues amounted to $9,448,195 in 1922, an increase of 60.6 per cent; operating expenses increased 83.1 per cent and net income made a gain of 198.6 per cent.

	1922	1917	Per Cent of Increase, 1917-1922
Number of operating companies....	†9	11	....
Miles of single track operated......	304.80	330.59	*7.8
Number of cars, all types..........	848	831	2.0
Number of persons employed......	4,768	3,169	50.5
Salaries and wages..............	$6,544,744	$2,260,429	189.5
Primary horsepower, total........	94,345	59,859	57.6
Kilowatt capacity of generators....	77,425	41,128	88.3
Current generated, kilowatt-hours	202,759,244	132,462,292	53.1
Current purchased, kilowatt-hours	6,615,333	5,314,781	24.5
Passengers carried...............	164,593,374	134,017,669	22.8
Revenue car mileage.............	20,428,933	23,832,650	*14.3
Railway operations, revenues......	$9,448,195	$5,882,095	60.6
Railway operations, expenses......	$6,828,380	$3,728,727	83.1
Net revenues, railway operations...	$2,619,815	$2,153,368	21.7
Auxiliary operations, revenues‡....	$6,955,027	$236,731	2,837.9
Auxiliary operations, expenses.....	$4,113,534	$126,870	3,142.3
Net revenues, auxiliary operations	$3,841,493	$109,861	2,486.4
Net operating revenues...........	$5,461,308	$2,263,229	141.3
Taxes assignable to railway operations......................	$1,437,237	$561,885	156.2
Operating income................	$4,024,071	$1,702,144	136.4
Non-operating income............	$114,109	$789,740	*85.6
Gross income..................	$4,138,180	$2,491,884	66.1
Interest and other deductions from gross income.................	$2,309,483	$1,879,425	22.9
Net income.....................	$1,828,697	$612,459	198.6

* Denotes decrease.

† Reduction due to mergers and to companies which bave discontinued operations.

‡ Chiefly revenues from electric light and power departments of electric railways.

Missouri—The figures show a slight increase in track mileage and an increase of 4.8 per cent in the number of passengers carried. Gross railway operating revenues amounted to $35,227,297 in 1922, an increase of 49.4 per cent during the 5-year period, but owing to a more rapid increase in expenses, net income shows a deficit of $183,118 in 1922 as compared with a net income of $1,363,367 in 1917.

	1922	1917	Per Cent of Increase, 1917-1922
Number of operating companies...	†19	20	....
Miles of single track operated¶....	1,170.58	1,144.28	2.3
Number of cars, all types..........	3,154	3,004	5.0
Number of electric locomotives....	6	7	....
Number of persons employed......	11,318	10,522	7.6
Salaries and wages..............	$17,055,620	$9,090,599	87.6
Primary horsepower, total........	161,527	136,348	18.5
Kilowatt capacity of generators....	106,800	100,555	6.2
Current generated, kilowatt-hours§	198,934,774	300,988,152	*33.9
Current purchased, kilowatt-hours	187,337,006	184,192,770	1.7
Passengers carried...............	**692,747,054	660,703,957	4.8
Revenue car mileage.............	80,657,516	80,670,043	....
Railway operations, revenues......	$35,227,297	$23,584,486	49.4
Railway operations, expenses......	$27,210,052	$16,035,391	69.7
Net revenues, railway operations...	$8,017,245	$7,549,095	6.2
Auxiliary operations, revenues ‡...	$1,651,055	$1,763,233	*6.4
Auxiliary operations, expenses.....	$1,178,820	$1,334,160	*11.6
Net revenues, auxiliary operations	$472,235	$429,073	10.1
Net operating revenues...........	$8,489,480	$7,978,168	6.4
Taxes assignable to railway operations......................	$2,721,326	$1,767,914	53.9
Operating income................	$5,768,154	$6,210,254	*7.1
Non-operating income............	$472,983	$170,259	177.8
Gross income..................	$6,241,137	$6,380,513	*2.2
Interest and other deductions from gross income.................	$6,424,255	$5,017,146	28.0
Net income.....................	*$183,118*	$1,363,367	....

* Denotes decrease.

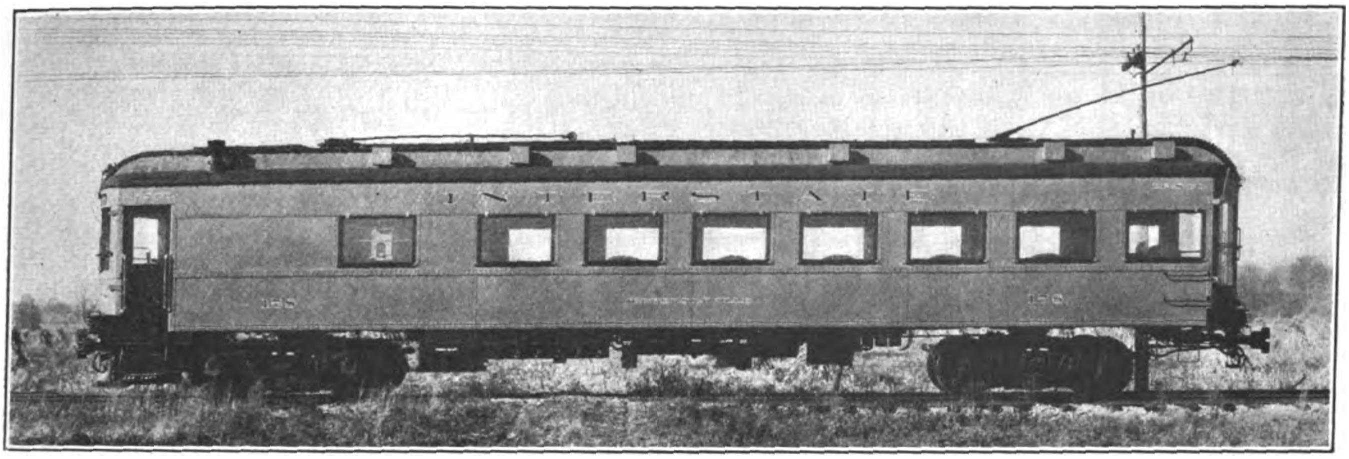
† Reduction due to mergers and to companies which have discontinued operations.

‡ Chiefly revenues from electric light and power departments of electric railways.

¶ Includes 98.74 miles in 1922 and 76.14 miles in 1917 lying outside the state but owned by companies within the state, and excludes 26.39 miles in 1922 and 25.51 miles in 1917 operated in the state but owned by companies outside the state.

§ Reduction in current generated due chiefly to change in operating conditions of one company which produced a large quantity of current for sale in bulk in 1917 while in 1922 only a relatively small amount was generated for sale.

** In addition there were 1,088,295 passengers carried by thirteen motor buses operated by electric railway companies.



Combination Club, Observation and Dining Car of Louisville-Indianapolis Line

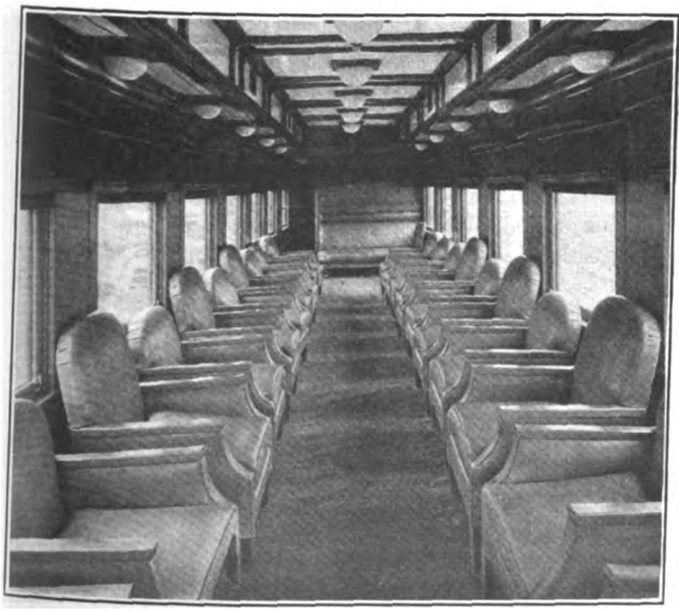
Interstate Starts Dining Car Service

Comfort and Luxury of the Interior Fittings and the Wide Variety Offered by the Menu Are Features of the Combination Club-Dining-Observation Car Service from Indianapolis to Louisville

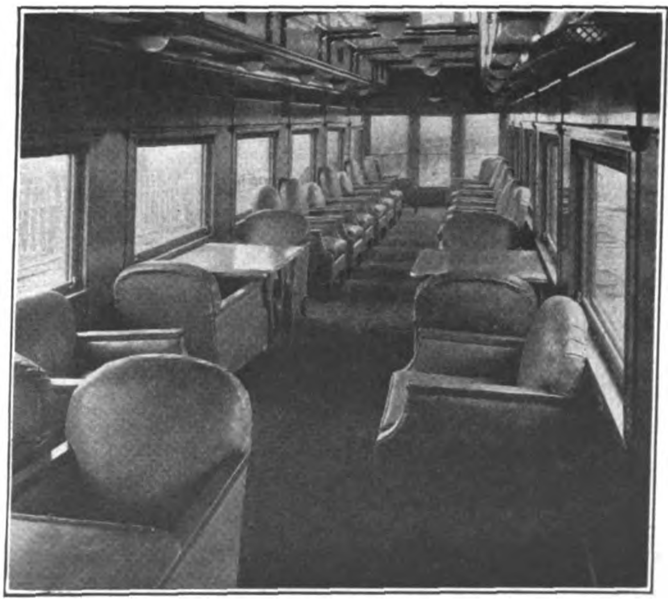
NEW equipment recently put in operation in the all-steel limited trains of the Interstate Public Service Company rivals in the commodiousness of its appointments the rolling stock of the crack trains of the largest steam railroads. These luxurious cars, costing $35,000 each, are in service on the Dixie Flyers leaving Indianapolis at 11 o'clock in the morning and 5 o'clock in the afternoon, reaching Louisville in three hours and forty-five minutes. Returning they operate on the Hoosier Flyers leaving Louisville at 11:45 a.m. and 5:45 p.m. Later it is expected that additional cars of this type will be used on other trains also.

The cars are combination club, observation and dining cars. Two-thirds of the car interior is devoted to a passenger compartment containing twenty-two individual chairs, upholstered in soft Spanish leather. Beside each seat is an electric push button connected with an annunciator. At one end of this compartment there is a long comfortable seat upholstered in the same material. This easily accommodates four people, thus increasing the passenger capacity to twenty-six. The rear end is arranged for observation with heavy plate glass windows extending nearly from floor to roof. In conjunction with the possibility of moving the chairs to any desired position, this arrangement enables the passenger to get with the utmost comfort an excellent view of the country through which the car is passing. In this respect the car excels the typical open platform observation car on steam railroads, as all dust is shut out.

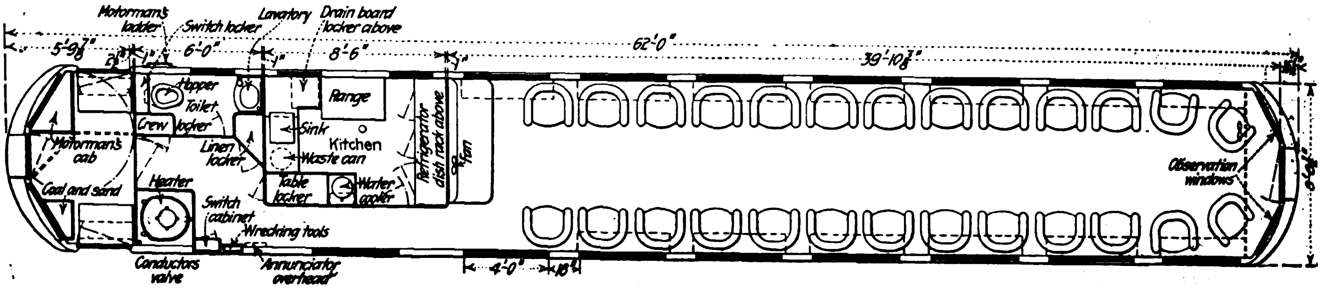
Side windows are also of plate glass and are equipped for winter with outside storm sash. Screens may be substituted in summer for the storm windows. The artificial lighting arrangements are attractive, consist-



There Are Twenty-two Individual Leather Upholstered Chairs in the Club Car and Seats for Four More



Showing How Tables Are Put In and Chairs Rearranged for Dining Service

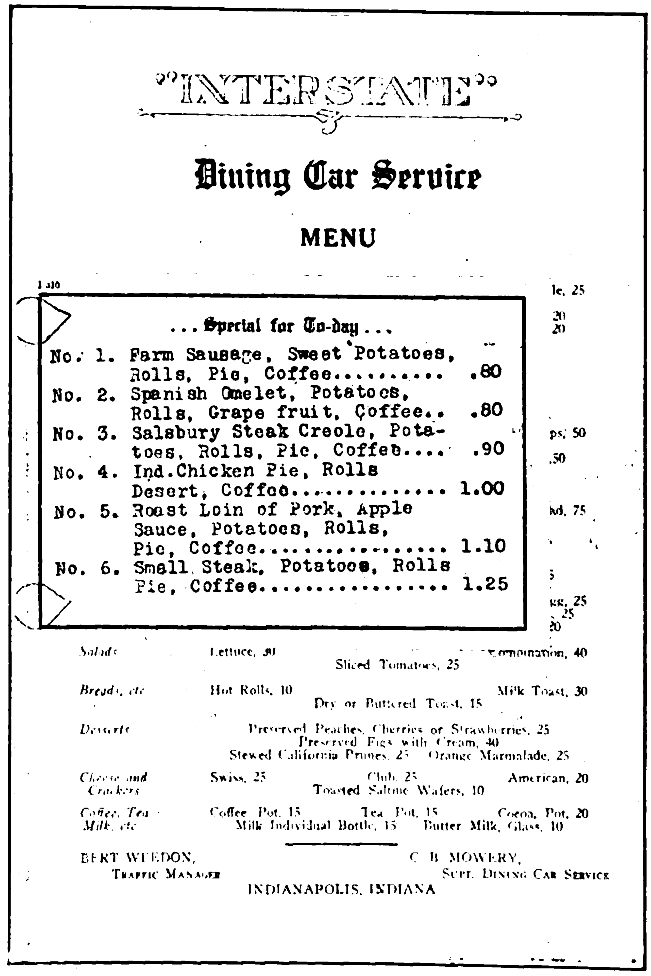


Floor Plan of New Interstate Diner-Club Car

ing of 100-watt dome lights in the center of each of the beams in the ceiling and 50-watt lights along the side. In addition there are emergency lights which operate from a storage battery whenever the power is off the car.

Portable tables which may be adjusted for the seating of two or four people, as desired, are part of the dining equipment. Place for the tables is made by simply rearranging the chairs. An extensive menu is provided, giving the passenger almost as large a choice of viands as he would have in a good hotel. Each car will have a crew consisting of a chef and a porter.

The kitchens are equipped in the same way as the kitchens of modern steam railroad dining cars. There is a cooking range, an ice box, provision locker and all other necessary features. The silver and china service are of the same high grade as the other equipment. The dining car service of the Interstate Public Service, Company has been placed in charge of C. C. Mowry, who until recently was assistant superintendent of the dining car service on the Monon Railroad.



"INTERSTATE"

Dining Car Service

MENU

... Special for To-day ...

No. 1. Farm Sausage, Sweet Potatoes, Rolls, Pie, Coffee.......... .80
No. 2. Spanish Omelet, Potatoes, Rolls, Grape fruit, Coffee.. .80
No. 3. Salsbury Steak Creole, Potatoes, Rolls, Pie, Coffee.... .90
No. 4. Ind. Chicken Pie, Rolls Desert, Coffee............... 1.00
No. 5. Roast Loin of Pork, Apple Sauce, Potatoes, Rolls, Pie, Coffee................. 1.10
No. 6. Small Steak, Potatoes, Rolls Pie, Coffee................ 1.25

Salads	Lettuce, 30	Sliced Tomatoes, 25	Combination, 40
Breads, etc	Hot Rolls, 10	Dry or Buttered Toast, 15	Milk Toast, 30
Desserts	Preserved Peaches, Cherries or Strawberries, 25 Preserved Figs with Cream, 40 Stewed California Prunes, 25 Orange Marmalade, 25		
Cheese and Crackers	Swiss, 25	Club, 25 Toasted Saltine Wafers, 10	American, 20
Coffee, Tea Milk, etc	Coffee Pot, 15 Milk Individual Bottle, 15	Tea Pot, 15	Cocoa, Pot, 20 Butter Milk, Glass, 10

BERT WEEDON,
TRAFFIC MANAGER

C. B. MOWERY,
SUPT. DINING CAR SERVICE

INDIANAPOLIS, INDIANA

The Interstate Menu Offers a Wide Variety

African mohogany of a light shade is used for interior trim. The ceiling is beamed in the same wood with white enamel between the beams. The side walls are entirely of mahogany, as is also the kitchen exterior and the various compartments and cabinets at the end of the car. Extreme simplicity marks the interior arrangement and this adds to the pleasing effect.

A hot water heating system has been installed for winter operation. In addition to this, however, there is an electric heating system, which may be used in case of emergency or on cool days in the spring and fall when the regular heaters are not required. Each car is equipped with three large electric fans, and a blower in the kitchen to remove whatever fumes there may be from the cooking.

The cars were built by the American Car & Foundry Company and are 62 ft. in length over all and 9 ft. 2¼ in. in width. Fully equipped, they weigh approximately 100,000 lb. Control has been so arranged that they can be operated as single units, although they will usually be used in multiple-unit trains, with a steel motor coach as the leading car. Each of the new cars is equipped with two G.E. 254 150-hp. motors on the front truck, geared for a speed of 70 m.p.h.

The additional fare on these cars between Indianapolis and Louisville is 75 cents per chair. Between Indianapolis and Columbus, Ind., the extra fare is 50 cents, and between Louisville and Seymour it is the same. It is 75 cents a chair from Louisville to all points north of Seymour and from Indianapolis to all points south of Tremore. It is the first service of this kind that has been established in the Indiana-Ohio interurban district and is proving very popular with the public.

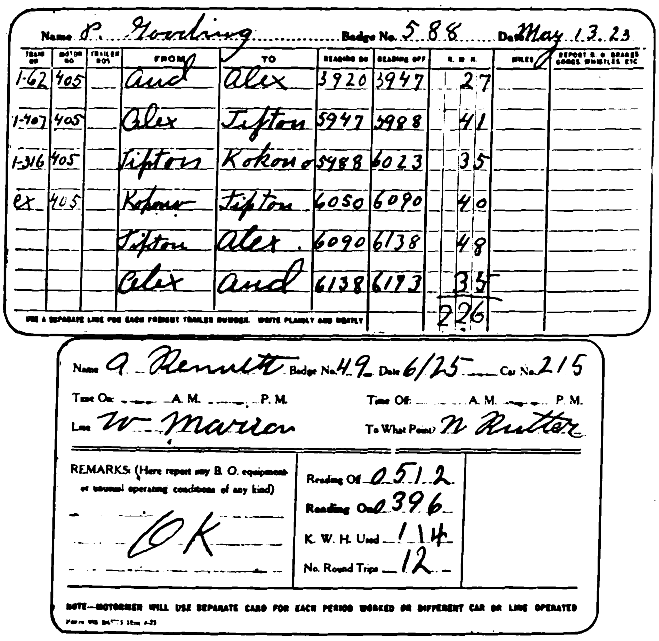
Coal Consumption Cut a Third in Three Years

By Attention to All Sources of Power Waste, Including Uneconomical Car Operation, Union Traction Has Saved Fuel and Reduced Maintenance Cost

FOR several years the Union Traction Company of Indiana has had under way a continuous effort to reduce power cost with the result that there has been a gradual reduction in coal consumption as follows: 1919, 124,030 tons; 1920, 102,573 tons; 1921, 85,224 tons; and 1922, 81,998 tons. Along with this has gone fairly steady increase in car mileage, from 7,813,419 in 1919 to 7,885,644 in 1920, 7,871,025 in 1921 and 8,330,112 in 1922.

An important feature of the campaign has been the use of meters on the cars, but it has also included attention to track bonding, the use of lighter equipment and its proper allocation, modification of gear ratio where desirable, best possible maintenance of cars, and adjustment of brakes, conservation in shops, substations, etc.

Accompanying the fuel saving there was a reflex influence on the equipment maintenance, which cost $45,000 less in 1921 than in 1920 and $14,000 less in 1922 than in 1921. A large part of this result was clearly attributable to the better handling of cars which came about through an effort to save energy by systematic coasting.



Name R. Gowling Badge No. 588 Date May 13.23

TRAIN NO	MOTOR NO	TRAILER NOS	FROM	TO	READING ON	READING OFF	K. W. H.	MILES	REPORT B. O. BRAKES GONGS, WHISTLES, ETC
1-62	405		And	Alex	3920	3947	27		
1-407	405		Alex	Tipton	5947	5988	41		
1-316	405		Tipton	Kokomo	5988	6023	35		
ex	405		Kokomo	Tipton	6050	6090	40		
			Tipton	Alex	6090	6138	48		
			Alex	And	6138	6173	35		
							226		

USE A SEPARATE LINE FOR EACH FREIGHT TRAILER NUMBER. WRITE PLAINLY AND NEATLY

Name A. Bennett Badge No. 49 Date 6/25 Car No. 215

Time On: ____ A. M. ____ P. M. Time Off: ____ A. M. ____ P. M.

Line W. Marion To What Point N. Rutter

REMARKS: (Here report any B. O. equipment or unusual operating conditions of any kind)

OK

Reading Off 0512

Reading On 0396

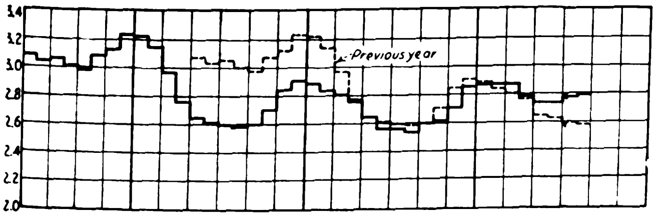
K. W. H. Used 114

No. Round Trips 12

NOTE—MOTORMEN WILL USE SEPARATE CARD FOR EACH PERIOD WORKED OR DIFFERENT CAR OR LINE OPERATED

Cards Used for Recording Energy Consumption on I. U. T. Cars Above, for interurban cars. Below, for city and suburban cars.

During the spring of 1920 the company installed Economy meters on its interurban cars. The company's safety engineer, R. E. Luellen, was put in charge of energy-saving activities.* It took some time to get the work organized, but by the end of the year it was in full swing. The result was a reduction from the consumption of 4.339 kw.-hr. per car-mile at the direct-current switchboard in 1920 to 3.803 kw.-hr. in 1921, or 12.3 per cent. The reduction for the following year over 1921 was to 3.629 kw.-hr., or 4.6 per cent. Thus, the saving for 1922 as compared with 1920 was 16.35 per cent. The fact that it was possible to make an additional saving the second year shows that the novelty of the 1921 campaign was not an important factor in its success. The energy consumption at the car for the past three years or more is shown on the accompanying graph.



Energy Consumption per Car-Mile at the Cars on I. U. T. Interurban Lines

In connection with the manufacturer's engineers, the railway company devised record cards adapted to its needs, one for the interurban cars, and one for the city and suburban cars, as illustrated. The backs of the cards are utilized to explain means of securing economical operation without losing time. The men read the meters and make their own records.

The local superintendents gather the cards daily and transmit them to the safety engineer, who files each man's cards for a month together. The results for each month are tabulated by lines, with the corresponding data for the preceding month. A copy of the summary is posted on the terminal bulletin board, with a table of totals for the several terminals. For the interurban passenger motor cars, the grand totals for the system are graphed, as illustrated, for comparison with the preceding year.

In order to impress the men with the relation between energy consumption and coasting, demonstrations have been conducted on certain days as follows: The men were asked to estimate their coasting on given trips, by counting poles, and to read their meters correspondingly. Comparisons were then made with the energy consumption immediately preceding. The coasting was found to range from 30 to 36 per cent.

The Readers' Forum

Railways Fail to Sell Themselves to Graduates

UNIVERSITY OF PITTSBURGH

PITTSBURGH, PA., Dec. 13, 1923.

To the Editors:

I note with interest your editorial in the ELECTRIC RAILWAY JOURNAL for Dec. 1 under the title "Transportation Field Needs to Be 'Sold' to Faculties." This thought is similar to other editorials and articles which have been appearing in the technical press for some time with reference to many public utilities. I feel that there is another point of view to be considered in a question of this kind. I think you would find in a survey of the engineering faculties of this country that they all appreciate perhaps as much as you do the importance of not only the specialized transportation field but other special utilities.

Did it ever occur to you that engineering teachers have certain ethical obligations in connection with problems of this kind? It seems to me that it would be entirely out of place for engineering teachers to emphasize one or more public utilities at the expense of others. In my own case, for example, I am probably more interested in the transportation field than any other phase of engineering. And yet I am very careful in presenting this matter to my engineering graduates for the reason outlined.

I do feel, however, that in this particular case there is a solution for the problem. During the number of years in which I have been connected with engineering teaching, I have been impressed by the absence of any definite program on the part of railway organizations to "sell" themselves to engineering graduates. It is now commonly accepted practice among our leading electrical manufacturing and many utility companies to visit the leading universities and technical schools late in the senior year for the purpose of acquainting graduating students with opportunities in their respective fields. Herein, as I see it, lies the explanation of the failure to build up the personnel of many of our transportation utilities.

H. E. DYCHE,
Professor and Head of Department of Electrical Engineering.

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*See article by Mr. Luellen in the issue of this paper for Oct. 22, 1921, page 728.

Association News & Discussions

Mid-Year Dinner Committees to Be Organized

A MEETING of local members of the committee on arrangements for the American Electric Railway Association Midyear Meeting was held at St. Louis, Friday, Dec. 21, at which the most important business was the report of the organization committee. This committee, which is in reality a committee on committees, has the responsibility of naming the committees and sub-committees, outlining their duties and functions and recommending their personnel to the general chairman, W. H. Sawyer. The members of this committee are C. O. Birney, chairman; B. W. Stemmerick, R. W. Williams, Herman Spoehrer and B. W. Frauenthal.

Two New Committees Organized by American Association

CONVINCED that the future success of electric railways lies largely in advancing the more general use of progressive methods, the executive committee of the American Association has authorized the formation of two new committees which will, broadly speaking, conduct a first-hand survey of the industry and report on the progressive work that is being done. This survey will include not only operating methods but the improvement of public relations and other activities of importance.

Each committee as organized consists of fifteen members. The United States has been divided into seven geographical districts, and a vice-chairman has been appointed for each. These men will do the field work for their respective committees. On each committee there also is one publicity man. The other seven members of each committee are executives of broad experience.

The success of the plan will depend in great part on the personality of the vice-chairmen and their ability to inspire confidence. Each one is expected to devote at least two weeks of his time, prior to July 1, to visiting and aiding the member companies in his district, both the time and expenses of the man to be borne by his employer company. One object of these visits will be to aid companies by advising them on how other companies are meeting problems, and another to seek advice and information for the benefit of the industry as a whole. While it is hoped that eventually it will be possible for the vice-chairmen to visit all member companies and extend help when needed, in the beginning it is suggested that they make surveys of the best properties in their territories.

The result of this work at the end of a year will unquestionably be to bring aid to a good many member companies, and, at the same time, make all the companies feel that they are a more intimate part of the American Electric Railway Association. The two committees also will have a rather comprehensive survey of the industry upon which to report at the annual convention.

The personnel of the two committees follows:

CITY OPERATION

H. B. Flowers, president New Orleans Public Service, Inc., New Orleans, La., chairman.

Regional Vice-Chairmen

R. F. Carbutt, New York, N. Y.
H. B. Potter, Baltimore, Md.
C. D. Porter, Hampton, Va.
R. W. Emerson, Cleveland, Ohio.
F. C. Chambers, Des Moines, Iowa.
W. E. Wood, Houston, Tex.
W. V. Hill, San Francisco, Cal.

Publicity

L. K. Starr, Atlanta, Ga.

Representative of Manufacturers

E. F. Wickwire, Mansfield, Ohio.

Members at Large

W. R. Alberger, Oakland, Cal.
G. H. Clifford, Fort Worth, Tex.
B. C. Edgar, Chattanooga, Tenn.
E. M. Graham, Bangor, Me.
C. W. Kellogg, Boston, Mass.
C. S. MacCalla, Youngstown, Ohio.
E. J. McIlraith, Chicago, Ill.
J. P. Pulliam, Milwaukee, Wis.

INTERURBAN OPERATION

Harry Reid, president Interstate Public Service Company, Indianapolis, Ind., chairman.

Regional Vice-Chairmen

F. W. Woodcock, Philadelphia, Pa.
H. L. Mitchell, Pittsburgh, Pa.
Samuel Riddle, Louisville, Ky.
J. S. Bleecker, Springfield, Ohio.
G. W. Welsh, East St. Louis, Ill.
V. W. Berry, Fort Worth, Tex.
W. V. Hill, San Francisco, Cal.

Publicity

Frank Blanchard, New York, N. Y.

Representative of Manufacturers

E. F. Wickwire, Mansfield, Ohio.

Members at Large

J. F. Collins, Jackson, Mich.
V. S. Curtis, New Haven, Conn.
H. A. Mullett, Milwaukee, Wis.
C. E. Thompson, Highwood, Ill.
J. C. Schade, Warsaw, Ind.

Power Transmission and Distribution

A MEETING of the committee on power transmission and distribution of the Engineering Association was held at association headquarters Dec. 10 and 11, the first day being devoted to the assignment of subjects and discussion of their scope, while the second day was given over to meetings of the various sub-committees. Those present were C. H. Jones, chairman; M. B. Rosevear, sponsor; G. C. Hecker, special engineer; J. W. Allen, Charles Gilman, C. L. Hancock, H. D. Hawks, L. T. Hixson, H. S. Murphy, J. F. Neild, H. A. Pharo, W. J. Quinn, W. Shaake, A. Schlesinger, J. M. Waldron, F. J. White, J. H. Drew, Mr. DeVries representing Adrian Hughes, Jr., and R. W. Eaton, who also served as secretary of the committee.

F. McVittie was appointed vice-chairman.

Tentative dates for this year's meetings of the committee were discussed. It was voted to hold the next meeting at Chicago, March 10 and 11.

The subjects assigned to the committee were considered in order, and the work proposed was referred to the sub-committees. The subjects include concrete poles, ruling dimensions of approach ears, dimensions of various types of suspensions, catenary suspension, trolley wire wear and composition, temporary connection to trolley wire, trackless trolley overhead construction, review of existing standards, and signal sections of the engineering manual.

On the subject of trolley wire, it was suggested that a joint special committee be organized from members of the power distribution and equipment committees to study the whole problem of current collection. It was also proposed that members of the power distribution committee put up "test miles" of trolley wire and obtain the life history of such installations.

Attention was called to the necessity for standardization of designs of approach ears so that the parts might be made less diversified and to some extent interchangeable. The same action was considered necessary for barn hangers and other hangers used in troughs.

Committee on Relief of Traffic Congestion

AT A meeting held at the Congress Hotel, Chicago, on Dec. 14, the T. & T. Association committee on relief of traffic congestion considered the preparation of a questionnaire to be sent out to member companies for the purpose of collecting data and studying means of relieving the increasing street congestion in the larger cities. With men present from various parts of the country, it was found that all had ordinances limiting parking and providing other regulations, but that these were not proving satisfactory in relieving the congestion. Chairman Paul E. Wilson of Cleveland presided. The meeting was attended by G. B. Anderson of Los Angeles, W. E. Thompson of New York City, D. L. Fennell of Kansas City and J. V. Sullivan, sponsor, of Chicago.

City Operation

THE committee on city operation of the American Association held its first meeting at Chicago, Dec. 14. Those in attendance were H. B. Flowers, chairman; R. F. Carbutt, R. W. Emerson, H. B. Potter and W. E. Wood, regional vice-chairman; M. E. Ailes representing L. K. Starr, publicity member; E. F. Wickwire, manufacturer representative; J. P. Pulliam, E. J. McIlraith, C. S. MacCalla and V. W. Berry representing G. H. Clifford, members at large; S. E. Emmons and E. J. Blair, guests; Labert St. Clair and G. C. Hecker of the association staff.

The secretary read the plan of organization and procedure, after which the aims and objects of the committee were discussed. As to the best method of starting the work, various plans were presented.

A number of subjects mentioned for investigation by the committee included the motor bus, traffic congestion, lightweight cars, one-man operation, power saving, etc. It was felt that one thing to which the committee might devote some attention is the question of higher schedule speeds. The slowing down of schedules in city operation was held to have brought about greater use of the motor bus and the private automobile.

H. A. Johnson, president of the Engineering Association, who was present at the afternoon session, spoke of the trips made by representatives of the Chicago, North Shore & Milwaukee Railroad and said he felt the benefits derived from these trips had crystallized President Budd's ideas and resulted in the formation of the committees on city operation and interurban operation. In his opinion the way to start the committee work was for the regional vice-chairmen to go out into their territories and visit the properties. He said that the resulting interchange of ideas would benefit both the regional vice-chairmen and the managers of the properties visited. He thought a meeting of the regional vice-chairmen should then be held in order to report and discuss what they had found.

President B. I. Budd was at the meeting for a short time and spoke of the possibility of manufacturers and bankers working out a plan for financing modern equipment to replace antiquated equipment. He pointed out what the motor bus manufacturers have done along that line. He also expressed the belief that increased speed and relief of traffic congestion are very important. He said he thought the committee might begin to prepare publicity material for future use, stressing the expensive street widening projects and boulevards undertaken by the municipalities for motor interests, and pointing out at the same time that practically nothing of that nature has been done for the street car riders, who constitute probably 80 per cent of the general public.

Mr. Budd expressed the hope that the committees would furnish information and ideas leading to modernization and toward further development of the industry. He said the industry has not by any means reached the limit of its development, and that if we can only get rid of some of the nightmares of the past and become imbued with the desire to give better service and promote better public relations the industry will go forward rapidly. He mentioned the enthusiasm and energy displayed in the early days of the industry and said that if the committees could only arouse a part of that spirit on the part of the managements today a tremendous amount of good would result.

It was decided to hold the next meeting at New York Jan. 10.

Interurban Operation

THE first meeting of the committee on interurban operation of the American Association was held at Chicago, Dec. 12. Those in attendance were Harry Reid, chairman; H. L. Mitchell, Samuel Riddle, G. W. Welsh, F. W. Woodcock and V. W. Berry, regional vice-chairmen; Frank Blanchard, publicity member; H. A. Mullett, C. E. Thompson and J. C. Schade, members at large; M. B. Lambert and C. L. Van Auken, guests; Labert St. Clair and G. C. Hecker of the association staff. E. F. Wickwire had come to Chicago following his recovery from a serious illness, but was unable to attend the meeting due to a relapse.

The plan of organization and procedure, referred to elsewhere in this issue of ELECTRIC RAILWAY JOURNAL, was read, after which the chairman outlined briefly his views regarding the scope of the committee's activity. The addition to the personnel of the committee of members at large from the Pacific Coast, the state of New Jersey and the Southeastern district was suggested.

Mr. Lambert suggested that the proposed committee activities be given wide publicity during the next two or three months. He then spoke of the opportunity presented through this committee and through the committee on city operation for the manufacturers to co-operate. He suggested that various manufacturers designate certain of their district representatives to cooperate by bringing to the attention of the regional vice-chairmen any outstanding features or improvements observed. Mr. Lambert thought the regional vice-chairmen also might bring to the attention of the manufacturers many suggestions that would be helpful in stimulating activity on the part of the manufacturers in responding to the needs of the industry.

In the ensuing discussion it was pointed out that it must be demonstrated to member companies that the association is attempting through the work of this committee and the committee on city operation to advance the general interests of the entire industry. Since the idea is just at its inception a great deal of discussion was devoted to ways and means of obtaining the desired information and distributing it to the member companies. It was proposed to get immediate publicity through the technical press of outstanding developments or accomplishments found. The committee agreed that such publicity should be given in advance of the committee's annual report where particularly interesting information was obtained by the regional vice-chairmen.

It was agreed that Chairman Reid would write to the manager of every interurban railway in the country advising him of the organization, plan and procedure outlined for this committee work.

President B. I. Budd, who was present at the afternoon session, expressed his appreciation to the chairman and the members of the committee for accepting the responsibility of this work. He said that he felt the help which could be rendered the industry was incalculable. Mr. Budd declared that the interurban situation was not so serious as many people thought. "I believe," he said, "that the erroneous impression regarding the situation in general is due largely to the lack of information or to the dissemination of much misinformation. A great deal of publicity is given to the weaknesses of the industry, but very little to its accomplishments." Better apparatus and tools and the more intelligent use of every known development and improvement require the dissemination of information in such shape that the application of these methods may be known to every one in the industry.

Another feature of the work discussed by Mr. Budd was the opportunity for the vice-chairmen to become acquainted in their visits with young men who are capable of development as future leaders. He suggested building up a list from which future committee men might be selected, and felt that the committee work would assist in developing these young men for the companies and for the industry, and thereby make available a flow of young men for positions of responsibility.

There was a general discussion of the relation of the motor vehicle to the industry and it was pointed out that the committee should direct its attention to this phase of the transportation problem.

Mr. Lambert suggested that the committee study the possibilities of the organization of holding companies to finance the purchase of equipment and establish central maintenance plants. He stated that his company would be glad to place at the disposal of this committee and the committee on city operation its experts on freight haulage and on shop practice.

Mr. Blanchard felt that there has been too great a disinclination on the part of managers to establish proper and friendly contact with the newspapers, which in his opinion are the best media in a community to establish direct contact with the general public.

He urged companies whenever they have real news to give it to the newspapers, but advised against the practice of attempting to secure free advertising by offering it to the newspapers as news. He urged a proper and reasonable amount of paid advertising by the companies. He suggested that the newspapers be used to acquaint the public, particularly in the small communities, with the companies' employees. He also suggested that the companies tell the public through the newspapers how its money is being spent in the communities and show what a large percentage of its receipts are returned to the community in wages, material and other items.

Definite Educational Plans Prepared

AT THIS year's meeting of the committee on education of the American Association, held in New York Dec. 18, the assignment of the executive committee was interpreted to instruct the committee to prepare an elementary text on electric railway economics. This the committee definitely plans to do if a way can be found to finance the undertaking. The proposed material will serve as a text for instruction in the fundamentals of electric railway service, aside from operating and mechanical considerations. These will form the basis for later plans.

The committee will at once canvass the field to learn, through the co-operating educational directors, what is now being done along educational lines by member companies.

A booklet will also be prepared for wide distribution among employees, to stimulate interest in education. This will be done with a view to impelling each employee to ask himself whether he is making the best use of the educational facilities already within his reach if he will but make the effort to utilize them.

Those present at the meeting were: Edward Dana, Boston, chairman; W. J. Edmunds, Pittsburgh; A. L. Hodges, Brooklyn, representing C. E. Morgan; A. T. Koehler, New York, National Industrial Conference Board; Myles B. Lambert, East Pittsburgh; H. H. Norris, New York; J. V. Sullivan, Chicago; Prof. W. H. Timbie, Boston. Messrs. Dana, Lambert and Executive Secretary J. W. Welsh were appointed as an executive sub-committee to inaugurate the plans of the committee as promptly as possible, and to Mr. Norris was assigned the duty of receiving suggestions as to the booklet and putting them into concrete form.

Chase Hotel, St. Louis, Where Midyear Convention Will Be Held

Publicity for Midyear Meeting

PLANS are already under way in making arrangements and securing publicity for the Midyear Meeting of the American Electric Railway Association, to be held in St. Louis on March 4. Col. A. T. Perkins, general manager United Railways of St. Louis, is chairman of the publicity committee, which has made arrangements to secure adequate recognition for the convention. St. Louis welcomes the convention for many reasons. It calls itself the "city surrounded by the United States." With the terminals of twenty-six railroads reaching all parts of the country it is the gateway to the South and Southwest.

Among its many advantages, the city especially prides itself on its electric railways. The United Railways, which has been in receivership for some years, has now advanced to a position where the Federal Court and the Public Service Commission believe that the time for reorganization and resumption of control by the owners is at hand. The company also has the important matter of several franchise renewals on hand on the east side of the Mississippi River.

On the Illinois side also, East St. Louis is a greater industrial center than St. Louis itself. It is served by the lines of the East St. Louis & Suburban Railway and affiliated properties under the leadership of President W. H. Sawyer, who also is chairman of the committee on arrangements for the dinner. The lines of this company terminate at the west end of the Eads Bridge at Third and Washington Avenues, St. Louis. With characteristic foresight, President Sawyer already has announced that the badge of any one attending the Midyear Meeting will serve as a pass on the east side line. The McKinley lines, now absorbed by the Illinois Power & Light Corporation, have a terminal in St. Louis at Twelfth and Lucas Avenues in the heart of the business section, reaching it by means of the McKinley Bridge over the Mississippi. On the Illinois side, these lines serve Granite City, Venice, Wood River and Alton on the line to Springfield, Peoria, and other Illinois points.

The city is looking forward with great interest to the Midyear Meeting. The Hotel Chase, St. Louis, Mo., where the Midyear Meeting is to be held, "in its appointments, furnishings, and beautiful settings is as beautiful as any in America," according to Mr. Sawyer. A street car line extends to the door of this hotel, which affords direct connection with the downtown business district in less than twenty-five minutes.

The Palm Room, in which the banquet will presumably be held, is large enough so that 950 persons can be seated with clear vision of the speakers' table. There is also the Crystal Ball Room with a seating capacity of 600, and an inclosed roof garden with a seating capacity of 600; the former probably will be the room used for the business meetings.

News of Other Associations

Midwest Association to Meet

THE Midwest Electric Railway Association will hold its next quarterly meeting at Springfield, Mo., January 17. There will be a morning and afternoon business session, at which several papers will be read, and a banquet in the evening with several prominent speakers. This association is composed of executives and operating officials of Missouri, Kansas, Nebraska, Oklahoma, Colorado and Arkansas.

New York Electric Railway Association

AT A meeting of the executive committee of the New York Electric Railway Association, held last week, the date of the midyear meeting was set for Thursday, Jan. 24. The meeting will be held in the Commodore Hotel, New York City. The morning session will begin at 10 a.m. There will also be an afternoon session and an evening dinner, also at the Commodore.

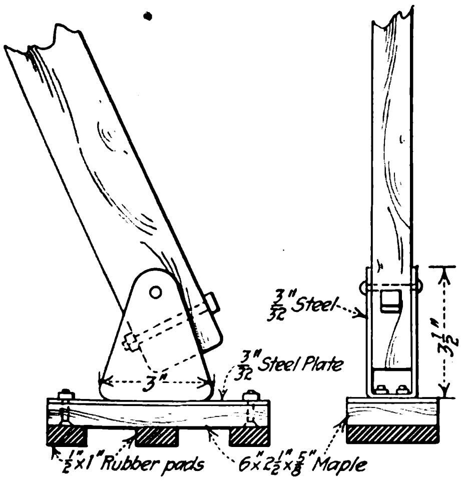
Wisconsin Utilities Convention.—The 1924 convention of the Wisconsin Utilities Association, will be held April 17 and 18 at the Hotel Pfister, Milwaukee.

Maintenance of Equipment

Safety Shoe for Shop Ladder

LADDERS used in the shops of the Chicago Surface Lines are equipped with "safety shoes" of the type shown in the accompanying sketch, to prevent slipping on the concrete floor.

These shoes are made up in the shop and consist of a U-shaped bracket of $\frac{3}{32}$-in. thick steel riveted to a flat plate $2\frac{1}{2}$ in. wide by 6 in. long. A maple block $\frac{5}{8}$ in. thick is bolted to the bottom of the plate and $\frac{1}{2}$-in. x 1-in. rubber pads are screwed to this block. This arrangement always brings the full area of the ladder footing into contact with the floor and the rubber further prevents slipping.


$\frac{3}{32}$" Steel
$\frac{3}{32}$" Steel Plate
3"
$3\frac{1}{2}$"
$\frac{1}{2}$"x1" Rubber pads
6"x$2\frac{1}{2}$"x$\frac{5}{8}$" Maple

This Shoe Prevents Ladder from Slipping on Concrete Floor

Soldering Contact Tips on M. U. Switch Group

A METHOD of fastening contact tips to the stationary contacts of switch group control on multiple-unit control cars has been worked out at the shops of the Metropolitan West Side Elevated Railway, Chicago, and has resulted in longer life to the contact tips with fewer failures of this particular part of the switch group mechanism. The contact tip is tinned on the under side after being formed to fit the stationary contact. The stationary contact is likewise tinned, and after the machine screws which ordinarily hold the contact tip in position are driven home, the assembled contact is heated and the two parts thus sweated together.

At the time the stationary contact is tinned, sufficient solder is used to fill up the counterbored hole into which the cable lugs are screwed. This holds these lugs securely in position and prevents arcing at the point where the lugs screw into the stationary contact.

This method of fastening the contact tip has made possible the wearing of the tip down to a thickness which previously could not be allowed on account of the warping of the tip and the consequent holding of arcs when the circuit is broken. This arc, although held down to a minimum by this new method, has in the past proved rather disastrous to arc boxes or arc shields on the switch unit. These shields are made of $\frac{3}{16}$-in. transite, and considerable pitting and burning has been experienced. To eliminate this trouble the transite is soaked in oil, waste oil from the control cylinders being used, and the arc appears to slide over rather than pit the shield.

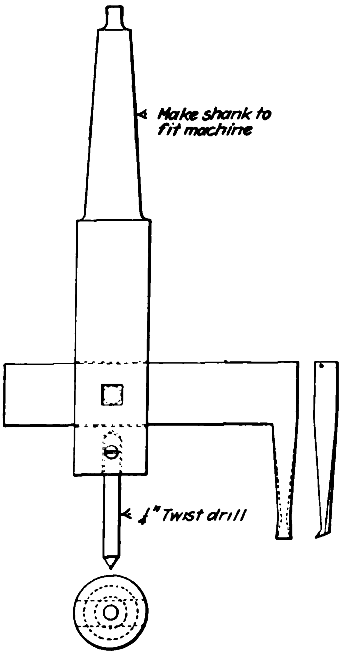
Convenient Tool for Cutting Dust Guards

By J. T. Porter

Master Mechanic North Texas Traction Company, Fort Worth, Tex.

THE Northern Texas Traction Company uses standard wood dust guards for its journal boxes, and has found the tool shown in the accompanying illustration of particular service for cutting the holes accurately. It is provided with a shank with the upper part arranged to fit the particular boring machine or drill press which is to be used. The lower part of the shank has a slot in which a right-angle cutting arm fits. The cutting arm is held in position by a set screw after being adjusted to the proper location for the hole which is to be cut. In making the tool, care should be taken to see that the set screw does not work loose. A good method is to countersink the arm where the set screw strikes it and then to use a locknut against the shank. The lower end of the shank is provided with a quarter-inch twist drill for accuracy in setting and to give a bottom support that will prevent vibration.

Previous to the use of this tool, the old method of cutting the holes in dust-guard boards was to mark off the hole and then saw out the circle on a bandsaw. With this method the outer part of the board has to be cut through to get inside and make it possible to saw the circle. This cutting through the outer part of the board weakens the dust guard and frequently results in breakage. It was also almost impossible to saw out the circle accurately, and as a result when the board was slipped over the shoulder on the axle there would be open places that would let in dust.



Tool for Cutting Journal Box Dust Guard

Another method of cutting the holes which was tried without success was to clamp the board in a chuck of a speed lathe and turn the hole out. This is a great improvement over the sawing method, but difficulty was experienced when the hole was being turned from the pressure of the chuck jaws. This pressure caused the wood to spring somewhat so that when the board was finished and removed from the chuck it would spring back and the hole would be slightly oval in shape.

By use of the tool shown in the accompanying illustration, dust guards for journal boxes can be cut on either a boring machine or a high-speed drill press. All that is necessary to hold the board in place on the bed of the machine is a clamp that will keep the board from turning or rising. The holes will be cut to exact size and will be entirely true. The use of this tool has shortened the time of cutting the holes in these boards at least 50 per cent over previous methods used. In cutting the holes better success was had by revolving the tool at a high rate of speed, as a cleaner cut hole is formed.

Increasing Trolley Wheel Mileage*

ALTHOUGH the trolley wheel is a very small part of a street car, it plays a very important part in its operation, and much time and money have been spent in perfecting current collectors. Some companies have found trolley shoes superior to the trolley wheel, but the experiments of the El Paso Electric Railway with several different trolley shoes were unsatisfactory and did not give the results which have been obtained with the trolley wheel.

The company states that its trolley wheel mileage record surpasses that of any other company in Texas, and for the past four years has been as shown in the following table.

Year	Miles per Trolley Wheel
1919	14,000
1920	18,000
1921	20,000
1922	22,000
1923 (based on seven months operation)	23,000

The company considers that this record is due largely to the fact that an expert trolley man is kept, who does nothing but supervise and inspect trolleys. They are carefully inspected each 2,000 miles, and if they show the slightest defect they are removed and placed in first-class condition before again being put into service. At every inspection the tension of the trolley base is tested with a special weight made for that purpose, and in this way the bases are kept at uniform tension. When the trolley wheels show the least sign of wear they are removed and sent to the machine shop, where a new groove is turned. Another reason for the large mileage is the fact that the overhead is kept in first-class condition.

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*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

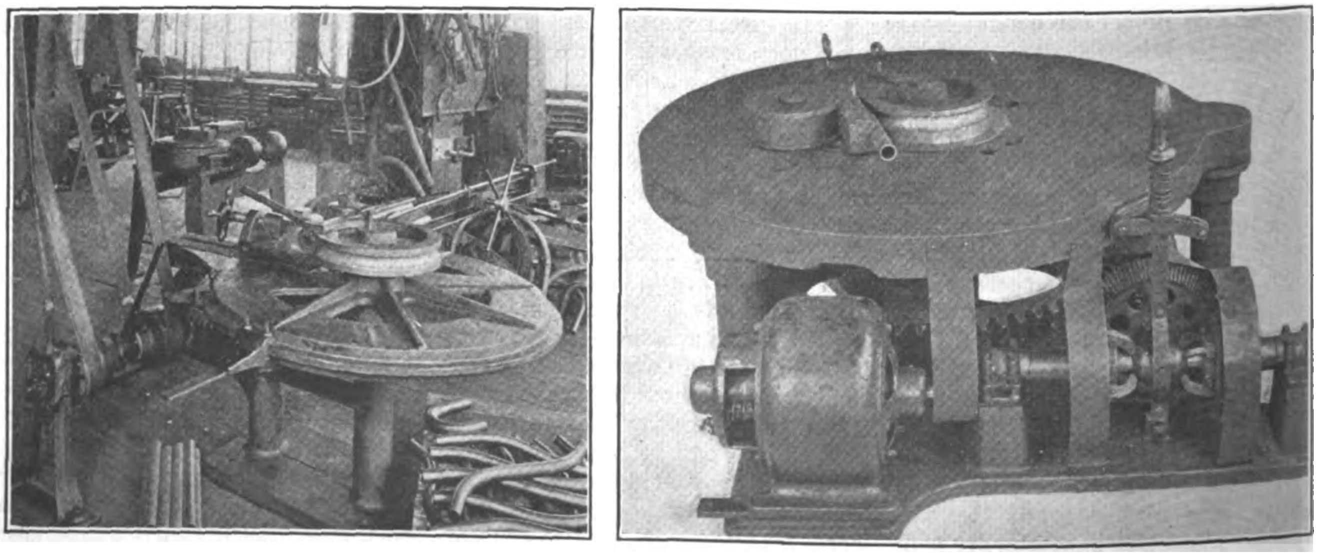
New Equipment Available

Pipe and Bar Bending Machines

SEVERAL machines for bending pipes, bars and structural iron have recently been placed on the market by the Wallace Supplies Manufacturing Company, Chicago, Ill. One line operated by belt drive consists of the types 5-B, C, D and E. These machines are practically the same, except that they are arranged so that different tool equipment can be used. The 5-B machine is arranged with suitable tool equipment for bending pipes or tubes, but separate tool equipment can be furnished so that angles, channels and other shapes can be bent on this machine. This line is intended primarily for use in bending tubing, electrical conduits, water, gas, steam and air pipes up to 2 in. diameter and for bending bars or structural shapes with 2 in. as a maximum dimension.

These machines are operated by throwing a friction clutch into engagement by means of a lever and can be operated either forward or reverse. Adjustable stops are provided to suit any degree of bend required. The clutch is automatically thrown out of engagement at both the end of the bending operation and when the machine has been reversed to the starting position. The fixtures for pipe bending provide for securing the pipes to the forms by means of a strap. Both the outside follower and the form are grooved with the proper clearance to secure the desired results. The outside follower bar operates between the tube and the roller, instead of the roller working directly on the tube. This method supports the tube for a greater distance and prevents flattening.

Special forms with inside follower bars or floating mandrels can be furnished for bending light-gage tubing to a short radius without danger of flattening or crimping. Heavier



At Left, Belt-Driven Pipe Bending Machine. At Right, Power-Driven Machine for Bending Larger Sizes of Pipes and Structural Shapes

gages of tubing than $\frac{3}{16}$-in. wall can be formed by using the outside follower bar only and dispensing with the mandrels for supporting the tubes on the inside during the process of bending.

The No. 15 Wallace bar-bending machine is used for bending cold metal bars of 1 in. diameter or 1 in. square, flat shapes ⅝ in. x 2 in. on edge or flatwise, and angles 2 in. x 2 in. x ¼ in. The machine can also be used on hot bending work 1½ in. squares or round, also flat shapes ¾ in. x 2 in., and angles 2½ in. x 2½ in. x $\frac{5}{16}$ in.

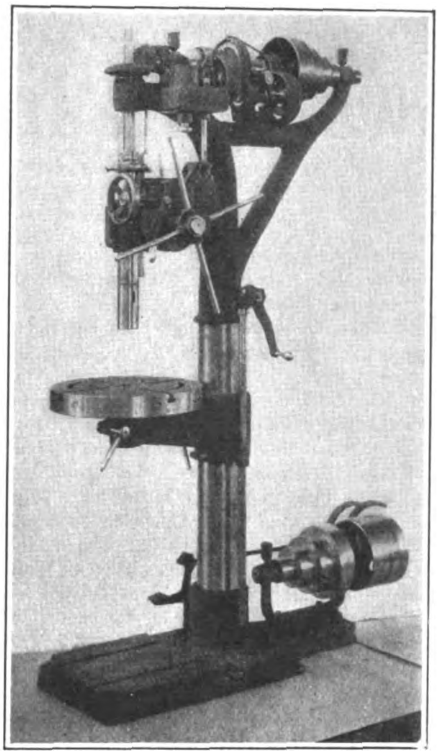
An adjustable stop mechanism is provided on the underside of the machine for automatically stopping and rotating the table at any predetermined point, so that materials can be bent exactly to any desired number of degrees. The speed of the rotating table is 6 r.p.m., the production varying according to the number of degrees that the material has to be bent, the length and kind of stock and also the size of the sections. A fair average production estimate for ordinary cold bending to 180 deg. is 150 pieces per hour, based on rounds, squares and flats bent flatwise.

The No. 8 Wallace machine is power driven and is of very sturdy construction. It was designed primarily for bending of reinforcement bars as large as 1¼ in., but the machine has ample power to bend two of these bars at a time and in this way production is increased. The machine can also be used for bending angle iron and for bending pipes of all sizes up to 4 in. diameter. The No. 8 bender will produce from fifteen to twenty bends per hour.

Improved Vertical Drilling Machine

THE accompanying illustration shows a 20-in. vertical drilling machine which has recently been redesigned and improved by the Superior Machine Tool Company, Kokomo, Ind. The improvements include bronze bushings, back gears, geared feeds, and wheel and pilot feeds. Particular attention has been given to a demand for a drilling machine for jobbing work.

The housings for the bearings are bored to standard dimensions, and the bushings which fit in these may be easily removed and replaced when worn. The spindle sleeve is made of cast iron, bronze bushed, and is graduated the full length of its travel. The stop collar is arranged to allow for maximum travel without removal. The column is well proportioned and is reinforced at sections subject to heavy strain. A 2-in. belt and pulley and 2¾-in. belt on the counter pulley are used for driving. This gives all necessary power for drilling within the capacity of the machine. Ample provision for lubrication is afforded for all working bearings. As shown in the illustration, this machine is belt driven, but it can be adopted for motor drive, with motor speeds varying from 750 to 1,800 r.p.m.



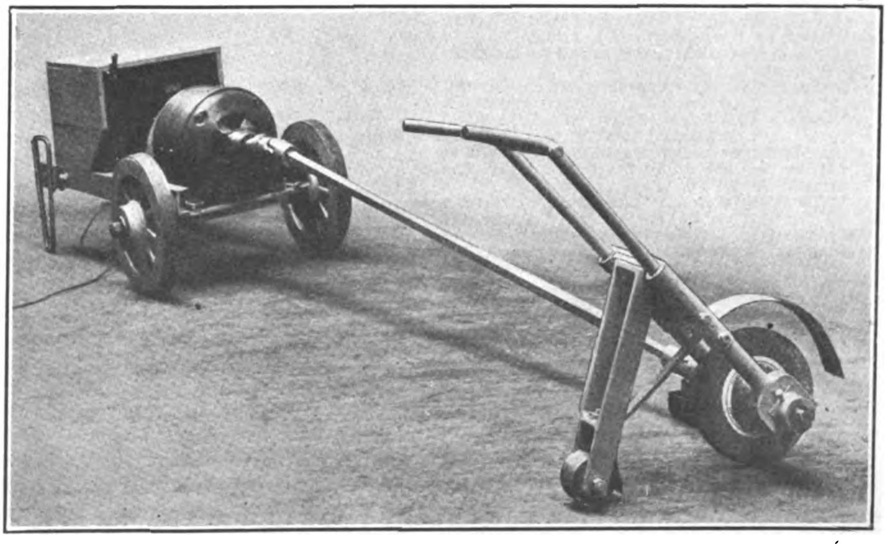
New 20-In. Vertical Drilling Machine

The table is reinforced by sectional ribbing and also has a large supporting shoulder on the hub, to give additional stiffness when drilling at the edge of the table. The height of the machine to the top of the pulley is 74 in., the spindle being 41 in. from the base. The distance from the table to the spindle is 25¾ in.; the traverse of the spindle sleeve 8½ in., and the traverse of the table 23¼ in. This machine drills on the center of a 20¼-in. circle. Six spindle feeds from 0.005 to 0.018 in. per revolution are available.

When belt driven, a driving pulley 9 in. x 3 in. running at a speed of 450 r.p.m. is used. This gives four direct spindle speeds from 971 to 875 r.p.m. and with the back gears in four additional speeds from 25 to 226 r.p.m. can be obtained. A 1-hp. motor is required if the machine is to be motor driven.

Rigid Shaft Connection for Track Grinder

A MACHINE for emergency work and for grinding the grooves of special trackwork has recently been developed and is being marketed under the name of the Vulcan telescopic shaft grinder, by the Railway Trackwork Company of Philadelphia, Pa. The principal feature of this grinder is the shaft connection, which is a square steel tube connected to the motor and grinder shaft by universal joints. The manufacturers claim that there is less danger of trouble and less breakage of shafts from this type than with the flexible shaft equipment. By using universal joints at each end of the telescopic shaft sufficient flexibility is obtained for the usual operations of grinding encountered on tracks and in electric railway shops. The apparatus weighs approximately 400 lb.



Track Grinder with Shaft Which Telescopes

The News of the Industry

One-Man Car Trial

Berkeley Will Use Equipment for Six Months—Oakland Fight Not Making Progress

Through its Council the city of Berkeley, Cal., has voted to put one-man cars on trial for a period of six months. The significance of this move is better understood when it is explained that at present there is an ordinance in that city which forbids operation of cars of this type; that Oakland, an adjoining city, has banned the one-man car, and that Oakland's Mayor sent a letter to the Berkeley authorities urging them to join with him in the war he is making on the San Francisco-Oakland Terminal Railways.

City Manager Edy and City Attorney Sanderson of Berkeley have been directed to prepare an amendment to the prohibiting ordinance, providing for a six months probation of the safety cars. The operation of the one-man cars in Berkeley will be limited to Ashby Avenue and Dwight Way.

The Council has also decided to permit the railway to operate buses in Berkeley at an annual fee of $60 a bus. All other applicants who sought similar permission have been excluded.

CITY MANAGER APPROVES PLAN

The action of the Council was based on an exhaustive investigation conducted by City Manager Edy as a result of which he recommended that one-man cars receive a fair trial. He held:

1. Operation of one-man cars need not be objectionable from the standpoint of policing.
2. Use of one-man cars may be expected to delay traffic or to bring about traffic congestion only if such cars are used on heavily traveled lines.
3. Traffic delays incident to the use of safety cars can be materially reduced by adopting the San Diego system of collecting fares as passengers enter on inbound cars and as they leave outbound cars.
4. No extra hazards surround passengers riding in such cars.
5. Operation of one-man cars should bring about an immediate improvement in service on the lines where they are used and, as economies are introduced, the city is manifestly in a better position to request a review of the company's rates by the Railroad Commission.
6. The so-called "one-man, two-man cars" are superior to one-man cars. If permission to use the latter is granted and if such use proves satisfactory to the public, the former should be operated to the limit of their practicability in Berkeley.

Objection to the proposed amendment is voiced by the Housewives' League, which is threatening to call a referendum on the matter. This, however, has not as yet been definitely decided. Improvement clubs are generally expected to back the recommendation of the City Manager.

The controversy in Oakland over the use of the one-man car appears to have passed the acute stage, at least for the time being. Petitions are still being circulated asking for a bond issue to settle the question of municipally operated buses, but the public seems indifferent. It is claimed that the necessary 6,000 signatures have been obtained, but on Dec. 11 the petitions were still in the hands of the circulators. Although the ordinance remains in effect that was passed against the use of the one-man cars in Oakland, cars of that type are still being run there.

In the meantime the city bus, the "Rosalie," continues to be operated by the city under the supervision of Commissioner Moorehead. An effort was made to purchase this bus, but the Council found a flaw in the ordinance, which specified that a "new" bus should be acquired. As the "Rosalie" was six weeks old at the time this ordinance was passed, a majority of the Council balked and the "Rosalie," although making official trips, is still only loaned to the city by the makers.

Mr. Moorehead recently announced that he had found funds among those of which he has control by which four new buses can be purchased. He has expressed the intention of asking the Council for permission to acquire these buses, but so far, he has failed to do this and the source of the funds which he proposed to use remains one of the deep mysteries of Oakland.

Making Plans for Railway Continuance in Massachusetts

In view of the court decree which calls for cessation of service on the Connecticut Valley Street Railway system, operated by a receiver, by March 1, a movement is under way to form a citizens' company in Northampton to buy the lines running from that city to Amherst and Hatfield. The Northampton Street Railway officials, while stating that they had no intentions of taking over these lines on their own behalf, have indicated that they might be willing to operate them under some arrangement with the prospective owners. In respect to the Greenfield and Turners Falls line no interest has been exhibited in the matter of arrangements to continue the road in operation, the residents apparently being resigned to the prospect of bus operation.

On the Northern Massachusetts system, active interest is being taken in Athol, Gardner and Templeton, in the plan to command local capital to purchase and operate stretches of road serving these communities. These plans are ordered with a view to buying the physical properties at a sufficiently low price to start the project on a paying basis. Service on the section running between Winchendon and Baldwinville was discontinued on Dec. 15.

New Contract Proposed

Cincinnati Committee Contends that Relations of Railways with City Are Discordant

Abrogation of the Cincinnati Traction Company's franchise and the awarding of the company with a new contract with no "entangling alliances," together with a fare not to exceed 7 cents and improved service for the car riders, are the outstanding recommendations in the report of Mayor George P. Carrel's traction committee, made public on Dec. 15. The report will be submitted to the City Council before Jan. 1 for ratification. The committee was appointed two years ago by Mayor Carrel to study Cincinnati's traction situation.

SIMILAR PROPOSAL MADE BEFORE

The proposals are similar to those offered in April, 1921 by W. C. Culkins, formerly Director of Street Railroads. At that time Mr. Culkins recommended that the service-at-cost franchise under which the traction company operates be abrogated. The Mayor's committee further recommends that the traction company be compelled to pay the cost of repairing that portion of the street along the rails for a distance of 2 ft. outside and between the rails. The committee also suggests that the aggregate capitalization of the Cincinnati Traction Company, Cincinnati Street Railway and the Cincinnati & Hamilton lines be reduced from $39,000,000 to $25,000,000; that the earnings of the traction company be limited to 6 per cent on the $25,000,000, and that the traction company be required to surrender its jurisdiction over all other activities in which it is involved and devote its entire energy to the operation of its electric railway system. Another provision suggested is that net earnings exceeding 6 per cent on the capital be applied to cut fares.

The Mayor's committee said it had reached the conclusion that the differences between the Cincinnati Street Railway and the Cincinnati Traction Company were irreconcilable. The report criticises the existing franchise, which it says is a partnership between a public body and a private enterprise, saying it has failed utterly of its heralded results at the time of its adoption. The Cincinnati Traction Company took over the local electric railway system from the Cincinnati Street Railway under a fifty-year lease in 1901.

It is pointed out that instead of fares being reduced or held at a specific rate they have advanced and the prospects are for indefinite advances. Along with this, the report says, there has been a steady decline in service.

The recommendations of the Mayor's committee were approved by the entire membership.

The committee found:

1. The mutual relations between the Cincinnati Traction Company and the Cincinnati Street Railway and the city of Cincinnati are discordant and lacking in necessary co-operation and harmony.

2. Maintenance of the traction properties has been deferred year by year until the accumulation of deferred maintenance will require from $2,000,000 to $4,000,000 to absorb.

3. The Cincinnati Traction Company has activities other than the transportation of people over the streets of the city.

4. The aggregate capitalization of the street railway properties in this city is excessive.

5. The service given to the public in the operation of the car lines is grossly inadequate and unsatisfactory.

6. The rate of fare, considering the service rendered, is unreasonable and excessive.

The committee recommended that:

1. The now existing contract of the city of Cincinnati, known as the service-at-cost franchise, be rescinded and abrogated.

2. A new franchise be offered, which shall provide among other things:

(a) A reduction in the aggregate capitalization of both the Cincinnati Traction Company and the Cincinnati Street Railway, including the Cincinnati & Hamilton lines, from approximately $39,000,000 as now claimed, to a sum, which including stocks, bonds, debentures, car certificates and all other forms of indebtedness, and such sum as shall be necessary to rehabilitate the system, or to so improve it as to assure first-class service, shall not exceed $25,000,000, and to which shrinkage and reduction both the companies should contribute.

(b) A provision limiting the rate of fare to a maximum of 7 cents based on present operating costs, with a further provision that net earnings exceeding 6 per cent on the capital investment, as above recommended, be reflected in diminution of fares.

(c) A cessation on the part of the operating companies of all activities save the operation of cars and the transportation of the passengers over the lines within the city limits and territory immediately contiguous thereto.

(d) A provision constituting a sum sufficient to take care of the cost of the repairing of that portion of the streets along the rails of the operating company to a distance of 2 ft. outside and between the rails, and that the same be a preferred charge against the earnings of the operating company.

(e) A provision to the effect that any order of the Director of Street Railroads, or other authorized city official, to the operating companies, shall be presumptively reasonable and to be complied with within the time specified in the order, unless declared by a court of competent jurisdiction to be unreasonable or confiscatory.

(f) The city officials in every department to take at once the necessary steps to compel a compliance with the above recommendations.

Americans Organize Company to Develop Foreign Utilities

Announcement was made on Dec. 18 by the Electric Bond & Share Company, New York, N. Y., of the incorporation in Maine of the American & Foreign Power Company, Inc., which will enter the public utility field of Cuba, Central America and South America. The organization of the new company, which marks the first time that American hydro-electric enterprise has been extended on a large scale into foreign countries, was effected by the Electric Bond & Share Company, the common stock of which is owned by the General Electric Company.

The president of the new company will be S. Z. Mitchell, who is also president of the Electric Bond & Share Company, and the following will be directors: Owen D. Young, chairman of the directors of the General Electric Company; Anson W. Burchard, president of the International General Electric Company; Clarence Dillon of Dillon, Read & Company, and Charles E. Mitchell, president of the National City Bank.

The ground work of the new company consists of a number of public utility companies acquired in the last few years by the Electric Bond & Share Company in thirty-nine communities in Cuba, Panama and Guatemala. Some of the more important are hydro-electric companies serving Santiago, Cienfuegos, Cardenas, Santa Clara and Camaguey in Cuba; the Panama Power & Light Corporation, which controls several important power units in Panama, and the chief power companies in Guatemala. Among these properties are included one or two electric railways. These will be developed so as fully to meet the needs of the territory they serve, but the plans of the new company do not now contemplate entering this field with new enterprises.

Community Chest Helped by Railway Employees

When the drive of the Allied Charities of Kansas City, Mo., and the Community Chest of Kansas City, Kan., was conducted, from Nov. 5 to 10, none of the institutions of Kansas City responded more quickly or more generously than the employees of the Kansas City Railways.. The men and the women who make up this organization were among the first to go over the top.

In former years outside committees have solicited the employees, but this was not satisfactory, so this year committees to handle the work were appointed in every division and at all departments on both the Missouri and Kansas sides and each committee in turn elected its own chairman or captain. Actual work was started by the committees on Nov. 1. The motto was: "A Day's Pay for a Year's Charity." The goal was 100 per cent subscribers from each member of the organization. Each evening the captain of each team telephoned his report to the secretary of the company, who tabulated the records and sent out daily bulletins showing the standing of the various divisions and departments.

Within six days the grand total of their efforts for the benefit of charity resulted in 3,290 employees subscribing $13,822.40, an average of $4.20, a record that no other organization in Kansas City bettered.

Vacancy for Engineer.—The United States Civil Service Commission announces an open competitive examination for assistant electrical engineer (power plant). This examination is to fill a vacancy in the Quartermaster Corps of the Army, Philippine Islands. Receipt of applications will close on Jan. 15.

Wage Plan Subject of Association Meeting in Philadelphia

One of the outstanding events of the annual meeting of the Co-operative Welfare Association of the Philadelphia Rapid Transit Company was the suggestion made by Dr. Arthur A. Mitten, secretary of the association, that a new wage plan should be put into effect based on the purchasing power of the dollar. Dr. Mitten's plan was announced following a recommendation by Ralph R. Nyman, retiring head of the association, that some new method for adjusting wages was needed to replace the so-called "three-city plan," which, he said, was made effective as a wartime measure and had outlived its usefulness.

Mr. Nyman said that since men and management are in Philadelphia together accomplishing more than was being done elsewhere it was not just that their wages should be governed by conditions in other cities. He said that 99 per cent of the men had agreed to accept a 65-cent rate, refunding the 2½ cents to the co-operative wage dividend fund, the present wage being 67½ cents. At the end of the year each worker is credited with 10 per cent of his year's wages in this dividend account, which brings the effective rate from 65 cents to 71½ cents an hour. Mr. Nyman announced that $3,300,000 in stock was held by the workers in the wage dividend fund. In addition; the Welfare Association owns 10,000 shares and the association itself, which administers sick benefits, has a membership of 99.96 per cent of eligible members. Mr. Nyman further said that the helping hand fund had distributed $30,000 to needy employees and that the savings fund had passed the $2,000,000 mark.

Dr. Mitten referred to the "three-city average" and said that during the war, when agitators sought to arouse trouble by contending that the wages were lower than the union scale, the company was in a defenseless position, because of the existing man shortage, and in order to avert the attempted strike planned to secure government intervention. It adopted the War Labor Board's wage rate decision for certain so-called first-class unionized cities and made this the basis for adjustment of employees' wages in all departments of the company.

He referred then to the determination of the company that beginning Jan. 1 of next year the basic wage rate would be 65 cents. He said that this wage assured the continuation of the present standard of living, which was better than heretofore experienced. He said in this connection:

"We should, therefore, in these prosperous days so plan that we be not overtaken by adversity when business depression makes decreased wages necessary."

The new wage scale, which is effective Jan. 1, 1924, was referred to in the ELECTRIC RAILWAY JOURNAL, issue of Dec. 15.

Virginia Property Relieved of Paving Between Tracks in Portsmouth

The State Corporation Commission has relieved the Virginia Railway & Power Company of the duty of paving between its tracks in Portsmouth. A counter action was overruled which had been brought by the city of Portsmouth, holding that the commission had no right to disturb a contract between the city and the company.

The case, the first of its kind in Virginia, arose not long ago when the city of Portsmouth decided to pave its principal street, a wide thoroughfare, and served notice on the railway that it would be expected to pave between its tracks and 2 ft. on each side of them, according to the contract with the City Council. The railway took appeal to the Corporation Commission, on the grounds that the property was not a paying investment and that the company could not be forced to expend funds for this work when the property was being operated at a loss.

Jurisdiction was the principal question before the commission, and that body decided that no city could enter into a contract prejudicial to the welfare of all. The principle of the decision is that the Commonwealth is greater than any of its political subdivisions. The commission held that there was no valid contract obligation on the company with respect to the alleged duty of paving and that even if there were such a contract the state had the power, with the consent of the company and over the protest of the city, to suspend such duty. It therefore overruled the demurrer of the city of Portsmouth.

Pointing to the fact that the company's losses from operation last year were about $100,000 and that the paving bill would be in the neighborhood of $175,000 (estimated), the commission decided that to impose this heavy burden upon the power company "under present conditions would be unjust and unfortunate; unjust to the power company and unfortunate to the public whose needs the company is designed to serve."

The commission states that the decision is on the merit of the proposal, and does not mean that similar action will be taken in other cases.

Ruling Rendered on Service Extensions.—Asserting that the Wisconsin Railroad Commission is without authority to order extensions of public utility services in municipalities, the Wisconsin Supreme Court affirmed the decision handed down recently by a lower court at Madison in the case of the state vs. the Washburn Water Works Company involving municipal or commission jurisdiction over municipal water main extensions. The Wisconsin Supreme Court in its latest decision held that authority to demand extensions and impose penalties for failure to comply with orders of the commission is vested in the municipality and not the commission. This ruling is regarded as likely to have an important bearing on railway extensions requested by municipalities.

M. O. Agitation Renewed

Messrs. Witt and Hatton Want to Take Over Cleveland Railway—Consummation of Plan Unlikely

Talk of municipal ownership of the railway system is again going the rounds in Cleveland.

Under the service-at-cost franchise with the Cleveland Railway the city has the option to purchase the property at any time by the payment of $110 a share for the stock. This stock is now selling in the market for about $95 a share. Inasmuch as there is approximately $30,000,000 par value of stock outstanding, with an additional $5,000,000 par value of bonds, it would require a bond issue of about $38,000,000 for the people of Cleveland to purchase the property.

The talk of municipal ownership was started recently because of the fact that Cleveland on Jan. 1 begins the city manager form of government, and Peter Witt and Prof. A. R. Hatton, two of the newly elected members of the City Council, are both avowedly in favor of municipal ownership of the Cleveland car system.

Following declarations by Prof. Hatton and Mr. Witt that they favored purchase of the railway lines, John J. Stanley, president of the Cleveland Railway, said he was agreeable to the city purchasing the lines at any time if the stockholders were paid $110 a share as called for by the option in the franchise.

On Dec. 17 Councilman John Sulzmann introduced a resolution calling for a bond issue sufficiently large to purchase the Cleveland system. This resolution was defeated in the City Council, but on a move to reconsider it is now in the hands of the street railway committee of the Council, where it will die with the present Council this year. Councilman Sulzmann's action was evidently taken merely to beat an expected move on the part of Councilman-elect Hatton after the first of the year.

During the life of the service-at-cost franchise in Cleveland, there have been two efforts in City Council to have the city purchase the lines. Both were defeated as was a proposition put up to the people of the city by the socialist party.

Most political leaders are of the opinion that any effort to bond the city for $38,000,000 to $40,000,000 for the purchase of the lines by the city would meet with defeat. It is the general belief in Cleveland that the service-at-cost franchise, with the City Council dictating the kind of service to be given, affords the people of Cleveland practically all the advantages of municipal ownership with none of the drawbacks inherent in such ownership.

Officials of Brooklyn Company Agree to Modification of Transit Plan

Gerhard M. Dahl, chairman of the executive committee of the Brooklyn-Manhattan Transit Corporation, has consented to accept a subway extension instead of an elevated structure as a means of ending the deadlock which has prevented the extension of the Fourteenth Street-Eastern subway from Meserole Street, Brooklyn.

The dual subway contracts called for an elevated structure for that part of the line, and the refusal of Lindley M. Garrison, formerly receiver of the old Brooklyn Rapid Transit Company, to permit the substitution of a subway brought about the deadlock, the Board of Estimate refusing to build an elevated line.

Mr. Dahl said that the directors of the company on the report of a special committee, composed of Robert Albert Shaw, Arthur S. Somers, Travis H. Whitney, William S. Menden, president of the company, and himself had agreed that the three projects should be considered as a unit under this program:

1. Dual subway contract No. 4, signed March 19, 1913, is still binding between the city of New York and the company. Under this contract the city agreed to construct the Fourteenth Street-Eastern line. This has not been completed. We are ready, however, to operate this line whenever the city finishes the work. We have been asked whether we will consent to a change in our contract so that the eastern portion may be constructed as a subway. As the public demand for this change evidently expresses the public need, we will agree to this change in the contract provided our present legal rights and claims are adequately preserved and the subway is constructed under plans which will connect it with our existing structures at East New York, but we wish to point out to the public that this company expended years ago, in anticipation of the early completion of this line, approximately $500,000 third-tracking the Myrtle Avenue elevated, which includes an express station at Wyckoff Avenue to connect with the Fourteenth Street-Eastern line. This expenditure will be wasted unless facilities are provided for the convenient transfer of passengers between the Fourteenth Street line and the Myrtle Avenue line at this point.

2. The second plank in our program of action is the construction of the Nassau-Broad Street line. This is also an unfulfilled part of Contract No. 4. The B.-M. T. is ready to equip and operate this line as soon as the city constructs it. Furthermore, as a part of this contract the city agreed to build shops and yards. These are urgently needed in order to maintain even the present service. When the Nassau-Broad Street line is built and the Fourteenth Street-Eastern line is completed, the present 50,000 daily victims of the Canal Street blockade will receive the direct relief which they demand and need.

3. The third plank relates to the proposed connection between the Fulton Street "L" and the Fourth Avenue system at Ashland Place. The B.-M. T. is entirely willing to sign a contract for the Ashland Place connection as soon as it has definite and tangible assurance that the city will construct and complete the Fourteenth Street-Eastern and the Nassau Street lines.

Increased Pay for Inspectors.—The compensation for first grade inspectors (road inspectors) in the employ of the Municipal Railway of San Francisco has been increased from $165 to $185 a month, effective Nov. 16. At the same time the salary of day dispatchers was increased from $175 to $195 a month and of night dispatchers from $165 to $185 a month.

Babtiste and Beard Honored

C. A. Babtiste and W. K. Beard, advertising managers of the ELECTRIC RAILWAY JOURNAL in New York and Philadelphia territories, respectively, were the guests of honor at a dinner on Dec. 17 at the University Club, New York. The occasion was to celebrate more than a quarter of a century of service by them with the McGraw-Hill Company. The theme of the dinner was dependability. James H. McGraw was toastmaster and more than 100 guests, mostly members of the McGraw-Hill organization, gathered to pay tribute.

After introducing the guests of honor and reviewing briefly the history of their association with the company, Mr. McGraw presented each of them with a check for $1,000, accompanied by a letter expressing his appreciation of their loyal, intelligent and dependable service.

Summoned from Philadelphia at almost the last minute, Mr. Beard was so completely taken by surprise that he said he found it difficult to express adequately his appreciation of the event.

Mr. Babtiste spoke brilliantly about the meaning of the publishing business to him and about the work of the company as an avocation for young men. He said that a publishing house to be successful as the McGraw-Hill Company has been could go forward only on the basis of "Service, more service and still more service."

During the evening L. W. Seeligsberg, formerly business manager of the ELECTRIC RAILWAY JOURNAL and now in business for himself, was presented with a gold watch as a token of appreciation from his former associates.

The dinner happened to be on Mr. McGraw's birthday and the occasion was seized upon by his associates to surprise him with the gift of a handsome watch and chain.

Indiana City Seeks to Buy Three-Mile Railway

The city of Washington, Ind., has petitioned the Public Service Commission for authority to buy the Washington Street Railway, consisting of 2.6 miles of track, six cars and two trailers and other property. The city, the petition said, has a comparatively new $140,000 electric power plant, which is equipped to provide current for the cars. The property of the company is assessed for taxation at $36,840, it was said.

Moving Pictures to Win Public Co-operation

The Boston Elevated Railway has adopted a new plan to secure the good will of the public. It will bring all its troubles to the attention of the public. It has just established an information booth in the Park Street station, one of the most congested points on the system, to keep the passengers informed on car movements and delays and suspensions and diversion of traffic routes.

In addition to this the company has adopted a movie film which shows actual incidents and conditions on the system that make for slower or interrupted service, and these pictures are to be shown in the theaters all over the district. The reel was shown in several houses in Boston this week. The picture presents the arrival of an irate passenger at one of the stations, greatly provoked by the fact that there is no car on hand to rush him into his office, for which he already is late. The starter is taken to task severely for such rotten service, and as the scene shifts from place to place the passenger learns about the open drawbridge, the breaking down of a motor truck, the traffic blockade at one point and a big fire at another and he learns about various other situations over which the company has no control, but which affect the service. At the end of the reel the irate passenger has become satisfied and congratulates the starter on doing so well with such handicaps. The public is expected to become more tolerant and give better co-operation after it has seen these pictures.

News Notes

Company and Every One Else Celebrating. — Considerable interest is being shown in street railway circles in the celebration of its anniversary month by the Northeast Oklahoma Railroad at Miami. The company operates interurban service between Miami, Okla., and Columbus, Kan. The company is carrying a series of advertisements in the newspapers giving information as to payrolls, passengers carried, cars moved, freight handled, and asking for public support and patronage. All employees are soliciting business and suggesting routing of freight over the line that issues their pay checks. Posters in store windows proclaim the desire of the company to serve. A company orchestra is giving concerts and a general "open house" is being conducted by all departments of the company.

Extension Matter Given Hearing.—Hearing in the matter of the petition of the Mayor of Amsterdam, N. Y., for an order of the Public Service Commission to direct the Fonda, Johnstown & Gloversville Railroad to extend its lines into the Fifth Ward of the city, under the terms of a franchise granted in 1910, was further continued without opposition until Jan. 14 at Albany to enable the company to put in some additional testimony. Witnesses gave evidence concerning the cost of building and operating the proposed extension and the demand for trolley service in the Fifth Ward. Estimates were also given as to the revenues which would be received by the proposed extension as well as the operating cost, the witnesses contending that such construction and operation would result in a loss to the company in its other operations in Amsterdam. City Attorney Fitz James contended that the company should live up to its franchise.

More Men to Receive Christmas Bonus.—Payment of the 1923 Christmas bonus will be made to 1,916 trainmen of the Los Angeles Railway. The exact amount of money that will be paid has not been computed, but there are eighty-six more men to receive bonus this year than last year, the total last year being 1,830 trainmen. Special awards to be made to the ten top safety car operators and the ten top motormen and conductors of each division will range from $10 to $100. These awards are made in addition to the regular bonus, which is $60, on a basis of $5 per month.

Newspaper Praises Railway.—Once again the members of the Common Council of Binghamton, N. Y., will consider the advisability of granting the Binghamton Railway the right to charge a 6-cent fare within the limits of the city. Editorial comments in the *Morning Sun* of Binghamton under date of Dec. 5 would favor the 6-cent rate in view of the fact that the company kept faith with its promises made at the time the 6-cent fare was first proposed, namely, that new and better cars would be added and the company's service improved. The writer does not hesitate to add that residents in the city of Binghamton can find consolation in their 6-cent fare when compared with a 7-cent and 8-cent charge in various other cities.

Accident on Indiana Interurban.—Several persons were reported injured in a double rear-end collision of interurban cars on the Louisville, Ky., and Jeffersonville, Ind., connecting bridge during a fog on the morning of Dec. 17. It was reported that the first car, from Charlestown, Ind., had slowed down, when it was rammed by a regular car from Jeffersonville. The Seymour, Ind., car, also southbound, in turn rammed the car from Jeffersonville. The front and rear platforms of the center car were wrecked, but the other two cars were able to proceed on their own power. None of the three cars was derailed. The three cars are all under the operation of the Interstate Public Service Company.

Safety Measures Devised.—To supplement the crossing protection already maintained at the scene of the recent Twentieth Century Limited wreck at Forsythe, N. Y., the Public Service Commission on Dec. 14th ordered the New York Central and the Nickel Plate Railroads to give twenty-four-hour flagman service, and the Buffalo & Lake Erie Traction Company, operating a trolley line over the highway at this point, to bring all cars to a dead stop and then have the flagman cross the highway again to see there is no danger of an accident to highway users.

Foreign News

London Tube Collapses

A strange mishap occurred Nov. 27 in one of the tunnels of the City & South London Railway near the Elephant and Castle station. Just after a train had passed the ground above subsided and blocked the tube.

For some time work has been in progress of enlarging the railway tunnel, which hitherto had been smaller in diameter than those of the other tube railways. It is planned to make all of the tubes uniform in size, so as to permit through-routing and allow the interchange of equipment.

In the main the tubes that are now in regular operation by the companies in the city of London are driven through hard clay. It was necessary to remove the cast iron lining of the tunnel, excavate the necessary amount of material and place a new lining of increased diameter in the tunnel. The cause of the subsidence was the disturbance of the ground during the progress of this work in the vicinity of a large underground cavity. The whole of the railway has now been closed against traffic and will probably remain out of service for some time. Meanwhile, an augmented service of buses has been out on the route.

Subway Project Approved

The Municipal Council has approved the subway project in Argentina. The work of building the new lines that are now proposed will be undertaken by the concessionaire in the near future.

English Electrification Deferred

The plan of electrifying the main line of the Southern Railway's London, Brighton & South Coast division from London to Brighton has been indefinitely postponed, according to Sir Herbert Walker, chairman of the company. He stated that the heavy commitments in the London suburbs, where traffic congestion is more serious, must be taken care of first. The plan for electrifying the main line would cost £10,000,000 and the directors of the company were not satisfied that it would prove a financial success.

Charge for Luggage on London Tube Railways

On account of the delay at stops, the London Underground Railways has begun charging for the conveyance of luggage or bulky packages. Where the ordinary single passenger fare is 5d. or under, the charge will be equal to the single fare, and where the ordinary single passenger fare is over 5d. the charge will be 6d. Passengers' personal luggage up to 14 lb. weight will be carried free.

Extent of Damage to Japanese Electric Railways by the Earthquake

Street Railway System of Tokio Lost 837 Cars and 50 Miles of Track—Much Other Damage Done in the City and Surrounding Territory Is Described

By Shiro Sano
Electrical Engineer, Tokio

THE sudden visit of the great earthquake on Sept. 1 left great damage to Tokio in various phases of metropolitan life, although the havoc wrought by the earthquake itself was not great compared with that due to the subsequent fire. The loss of life and property Tokio received at this time is the greatest ever experienced there, although the city has previously been visited by great earthquakes, on an average once in every century.

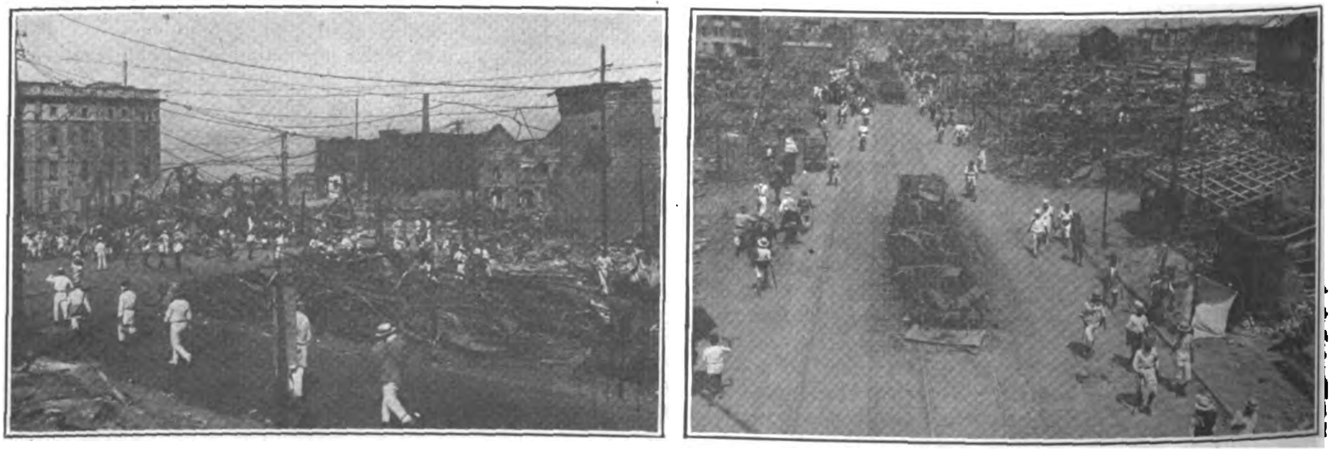
The street railway system of Tokio suffered a loss of nine substations, five car sheds, the main office and five branch offices, and 837 cars. About 100 miles of trolley and distributing lines and 50 miles of track were either burned down or disfigured by the quake. The total loss is estimated at about $20,000,000. The damaged substations include two of 3,000 kw. each, one of 2,250 kw. and one of 2,000 kw. Fortunately, about 300 cars were saved and six substations were left intact, their outputs totalling 10,640 kw.

All the machines used on the system are either rotary converters or motor generators, except two sets of mercury rectifiers with a capacity of 550 volts, 900 amp. each, in the course of erection, which were burned.

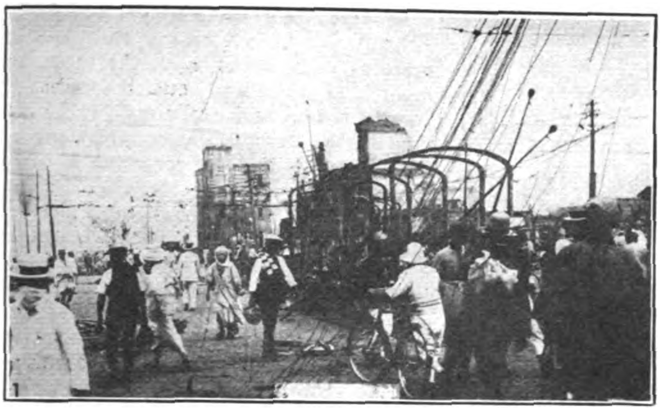
The city has no generating station of its own, but purchases all of the energy, mainly from the Kinugawa Hydro-Electric Company. The damage to this company was slight and it was ready to supply electricity Sept. 4.

The operation of the street railway of Tokio was resumed Sept. 6 with a limited number of cars on a few routes only, but operations were gradually widened as the reconstruction proceeded. By Oct. 1 the track in use had increased to 89.5 miles, the number of cars running to 400, the number of passengers carried to 863,000, with total carfare of 38,771 yen ($20,000). The greatest trouble in the way of reconstruction is the shortage of cars, although every step is being taken to build new cars and to repair those partly destroyed. Cars from other cities could not be used, owing to the 4-ft. 6-in. track gage of Tokio, which is a relic of the old-time horse cars. To provide for immediate service the city authorities decided to order 1,000 Ford automobiles to be used in conjunction with the electric cars.

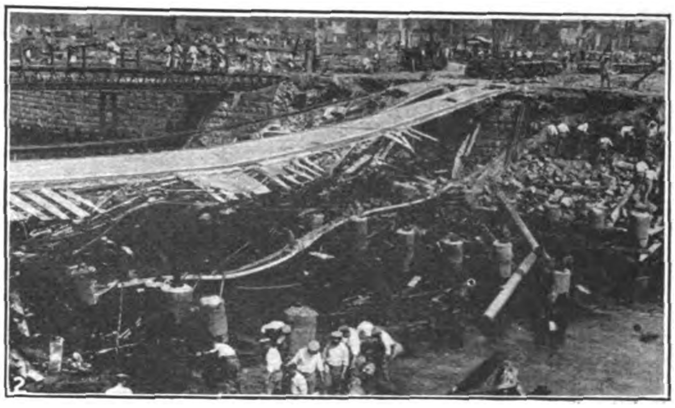
Free service was offered from Sept. 6 to Sept. 17 to all passengers, but later this gratuity was limited to holders of "certificate of sufferer." From Sept. 26



Street Car Burned in Front of the Famous "Shiroki-ya" Department Store. At Right, Destruction on Ainza-dori Street



No. 1. Many Cars Were Completely Burned in the Fire Following the Tokio Earthquake



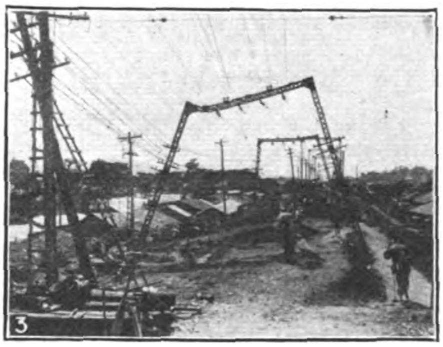
No. 2. A Number of Bridges Collapsed Completely. The Men in the Foreground Are Military Engineers

on free rides were discontinued and new rates of fare put in effect. Before the quake a charge of 8 sen was made for a single ticket, and 15 sen for a return ticket, with free transfers. The fare has since been changed to 6 sen for single and 10 sen for return tickets, without transfer. This really is a kind of fare-raising in the guise of low rates. It is, however, to be abandoned as soon as the system recovers to normal. The reason advanced by the city officials for the change is the lack of facilities for printing transfers.

The street railway system of Yokohama was almost entirely burnt up and it was only on Oct. 2 that it began operation on a few routes with freight cars as passenger cars.

SUBURBAN RAILWAYS

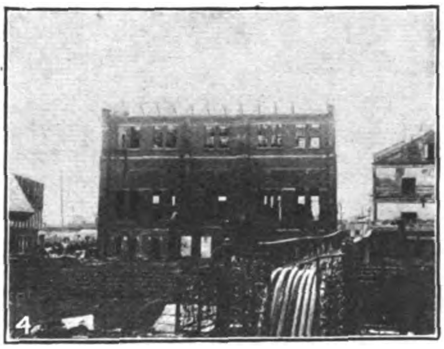
The damage done to the suburban railways is comparatively small and most of the systems began their operation soon after the catastrophe. The Keihin Electric Railway received damages to two car sheds and its generating station, and lost four bridges. It began partial operation on Sept. 11, and on Sept. 17 resumed service on its entire system. The income increased greatly owing to the suspension of the parallel line between Tokio and Yokohama of the Imperial Government Railways, whose generating station was destroyed.



No. 3. The Line of the Keihin Electric Railway Was Destroyed by the Earthquake

The Tamagawa Electric Railway received no damage from the quake, but the purchased power supply of 3,000 kw. was stopped for a while. It was unable to operate until Sept. 8. The Keisei Electric Railway received only slight damage and began operation soon after the earthquake. It offered free service until Sept. 8. The Keio Electric Railway, the Oji, the Meguro Kamata, the Ikegami, the Chichibu and the Musashi railways received but slight damage and resumed operation within a short time.

No. 4. The Yuraku Street Substation Was Completely Gutted by Fire. This Is One of the Tokio Stations Lost

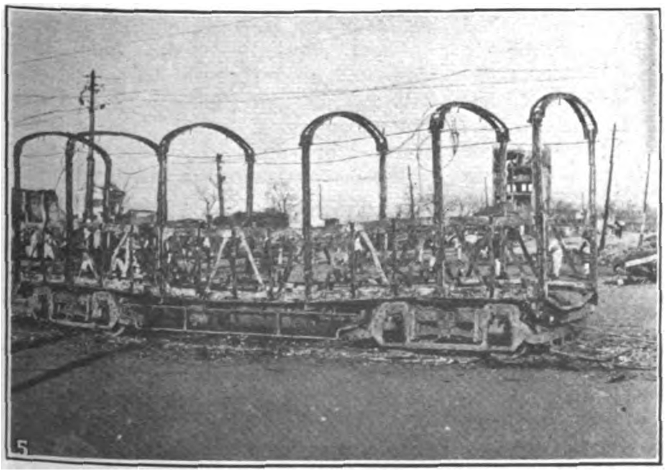


The general tendency of the suburban railways is toward an increase of passengers since the quake. The reason attributed is the exodus of city dwellers to the suburbs, as their homes were destroyed by fire, and they were obliged to find accommodations outside.

A bureau of reconstruction was formed after the calamity and is busy in planning the new Tokio. According to the proposed plan the city will have a number of subways under the main streets. This is expected to facilitate greatly transportation in the future.

[From other sources it is learned that the total loss suffered by the electrical industry in Japan will exceed $100,000,000, and it will require three to five years to restore pre-earthquake conditions. A portion of the photographs reproduced herewith are furnished through the courtesy of S. Hirota, chief editor of the *Ohm*, Kobe, Japan, and S. Yamazaki, chief engineer, Investigation Department, Tokio Electric Light Company.—EDS.]

No. 5 All that Was Left of a Tokio Low-Floor Car



No. 6. Remains of the Ueno Electric Railway Station

Financial and Corporate

Valuation Appeal Argued

City Presents Its Case to Superior Court Seeking Relief from Commission Valuation Ruling

Argument was begun on Dec. 13 before the Superior Court of Pennsylvania on the appeal by the city for relief from the order of the Board of Public Utility Commissioners of the state upholding the 7-cent fare on the lines of the Philadelphia Rapid Transit Company upon a valuation of the company's which the commission fixed at substantially upward of $200,000,000. The questions which the city says are involved in the appeal are:

1. Is the order of the commission reasonable and in conformity with law?
2. Is a valuation based on present reproduction cost correct?
3. Is the 1907 franchise contract between the railway and the city binding as to rates?

The city desires the Superior Court to remand the case to the commission with directions to reconsider the matter and decide it in conformity with law.

CONTENDS COMMISSION ORDER UNREASONABLE

The contention of the city is that the commission's order is vague and evasive and therefore not reasonable. The city holds that on its face the commission's order does not show enough facts to enable a reviewing court to check its correctness. In analyzing the difference between city and company figures on present reproduction cost the city says that the commission's order takes up only four items covering $49,000,000, out of a total difference of $103,000,000. The city contends, in short, that:

> The commission makes a substantial allowance for going concern value and for economies in operation without stating the amounts. It fails to state a definite valuation. It is a determined effort to uphold the rate of fare created and instituted by the commission itself, without adequate reasons, published too hastily within ten days of the argument of a case of such magnitude, showing the 10,000 pages of testimony were not carefully weighed.
>
> 3. The valuation is based exclusively on present reproduction cost, which is not in conformity with law. The commission rejects all the city's figures on original cost and investment without consideration, and after comparing insufficiently the city and company figures on present reproduction cost new, concludes that as it would cost substantially upward of $200,000,000 to reproduce the property today, that is its present value. This is contrary to the decision of the Supreme Court of the United States in the Atlanta Gas case, decided last June, which followed the Galveston Electric case of 1921. These cases decide that present costs must be given weight, but it is wrong to adopt them as the sole measure of value.
>
> There are other errors of law in the opinion. The commission allows $14,000,000, the cost of paving done by the company, calling it price paid for the franchise, when in fact the company itself carries its annual paving payment, of $500 000 under the 1907 contract, as part of its operating expenses, and the commission has approved this practice. The commission allows $13,000,000 for loss of fair return during early years of operation, when in fact the history of the property shows it was profitable from the start, earning an average of 12 per cent from 1861 to 1890. It allows $17,000.000 for cost of financing, an item the Supreme Court of the United States decided inadmissible in the Galveston case. It rejects the city's investment figure of $131,000,000 on incorrect grounds, as shown from the testimony.
>
> The order is unconstitutional, as it impairs the obligation of the contract of 1907. That contract is binding. It was specifically authorized by the act of Assembly of April 15, 1907, which, under the decision of the United States Supreme Court in the Home Telephone & Telegraph case in 1908, gives it binding force. Even if the commission has power to alter rates fixed in ordinary franchise ordinances under the police power, that power does not extend to a contract like this, under which the city gave up valuable considerations in exchange for the rate promises made by the company.

During the presentation of the city's side by Samuel Rosenbaum, assistant city solicitor, Judge Keller interposed to remark:

> They (the commission) evidently did not deem material the question of the actual value of the company's property as "upward of $200,000,000" was sufficient to justify the establishment of the 7-cent fare as a proper return to the company.
>
> There was no need for the commission in the circumstances to determine definitely exact values. How much more than $200,000,000 the valuation should be would make no difference, as that valuation was sufficient to justify the present fare.

The case was concluded on Dec. 14 with the presentation of the argument of Frederick L. Ballard, counsel for the company. The court reserved decision.

Mr. Ballard said that the fare paid in Philadelphia is justified by the high quality of the service rendered, irrespective of what is the fair value of the property of the railway. Mr. Ballard declared that the fare of 7 cents cash or four tickets for a quarter had enabled the company to operate the Frankford "L," build two crosstown lines, operate the trackless trolley over Oregon Avenue and buy 520 large passenger cars.

"This state," Mr. Ballard added, "still is willing to reward those servants that provide good service." He referred to a section of the public service company law according "to any public service company financial recognition of efficiencies, economies and improvements effected by it."

EFFICIENT SERVICE CONCEDED BY CITY

These factors of efficient service had been conceded by the city and properly considered by the Public Service Commission, Mr. Ballard pointed out, but the commission went further. That body, in determing that the present fair value of the company's property was substantially upward of $200,000,000, gave due regard, he said, to the many other factors of rate fixing.

The attorney explained that figures submitted to the commission showed that the company's service was "quicker, more frequent and more direct" than in a majority of the leading American cities and that the fare in Philadelphia was 6.6 cents compared with 7.9 cents in those cities.

In June, 1920, the Philadelphia Rapid Transit Company, feeling the need of more revenue because of war prices of labor and supplies, sought to abolish free transfers and exchanges in the delivery district, but the commission ordered a valuation to serve as a basis for a permanent rate of fare. In October, 1920, the company again asked for an increase, this time to a straight 5-cent fare, without transfers or exchanges. The commission refused this and instead ordered a temporary fare of 7 cents cash, with four tickets for 25 cents for six months until the valuation was completed. In May, 1921, this was continued. The valuation hearings did not end until May 15, 1923. The case was argued before the commission on June 11, 1923, and within ten days the commission published its order. The city promptly appealed.

In its original order the commission held in brief as follows:

> 1. A definite valuation is not essential except to protect the company from confiscation or to protect the public from unreasonable profits
> 2. The city's various investment and cost figures are not reliable enough to be controlling and, in any event, the decisions forbid the commission so regarding them.
> 3. On the contrary, the decisions require the commission to give substantial weight to present reproduction costs. On this basis, the value of the property is substantially upward of $200,000,000. The city admits $187,000,000 undepreciated and the commission decides enough disputed items to bring that over $200,000,000. The commission is not certain anything should be deducted for depreciation, but if so, it is at least offset by going concern value, both of which are intangibles.
> 4. The present rate of fare is reasonable when compared to that in other cities and to the present value of pre-war dollars; under it the company is giving good service and improving it, and enjoying a generous return after paying liberal operating expenses, so it is not confiscatory. But with a property valuation of at least $200,000,000, this return is not excessive, so we dismiss the complaint.

Loans Needed for Seattle Municipal Payments

With a cash deficit of about $780,000, not to be confused with the book deficit of $1,144,803, the Seattle Municipal Railway will need more loans to meet the $833,000 redemption payment and $333,350 interest due March 1 on the $15,000,000 purchase bonds, according to an announcement of city officials. The financing contemplated between now and Feb. 1, when the redemption and interest money must be set aside, will involve loans of between $350,000 and $400,000, treasury officials state.

About one-half of the cash deficit was piled up during the three and one-half months last spring when the railway was on a 5-cent fare between March 1 and June 16. With the return to the 8⅓-cent fare, the railway is making a small net profit, its monthly reports have shown, and the book deficit for the ten months of 1923 for which financial statements have been completed totals $167,312, showing a considerable recouping of the 5-cent fare losses. City officials are hopeful that the cash deficit will be wiped out by the end of 1924 or early in 1925. Details of the necessary new loans have not been worked out.

Abandonment Authorized

Ohio Body Rules Service May Stop from Youngstown to Girard, Niles and Warren—Cities Seek Postponement

The West End Traction Company, a subsidiary of the Pennsylvania-Ohio Electric Company, controlled in turn by the Republic Railway & Light Company, with the consent of the Ohio Utilities Commission, will terminate its service from Youngstown to Girard, Niles and Warren on Jan. 1. Service will also be discontinued from Niles to Mineral Ridge, from Warren to Leavittsburg and on the city lines in Warren. The population in these communities aggregates 50,000. In all, about 20 miles of trackage is involved. The order of the commission was entered Dec. 14.

	Year 1920	Year 1921	Year 1922	Nine Months 1923
Total revenues	$575,919	$478,129	$477,729	$356,634
Operating expenses	621,763	544,731	485,324	374,372
Operating deficit	$ 45,844	$ 66,602	$ 7,595	$ 17,737
General taxes	63,000	63,000	63,854	29,658
Total deficit	$108,844	$129,602	$71,449	$47,396

The cities of Warren, Niles and Girard, in Trumbull County, have since petitioned the commission to delay until Feb. 1 from Jan. 1 the abandonment of service. The company has consented to the modification of the commissions order with the understanding that increases in fare will be granted to permit operation to continue.

The West End Traction Company filed its application with the commission on Oct. 6. It sought authority permanently to abandon all of its property, comprising an electric railway extending from the westerly limits of the city of Youngstown, to the city of Girard, a distance of approximately 1 mile; thence to the city of Niles, a distance of 5 miles; thence to the city of Warren, a distance of 5 miles, and thence to the village of Leavittsburg, a distance of 4 miles, together with a line running from Niles to Mineral Ridge, a distance of about 3 miles. In addition to these direct lines the company also operates two short loops in the city of Warren.

At the hearing on the matter on Nov. 16 demurrers were filed by the cities of Niles, Warren and Girard and by the Commissioners of Trumbull County, denying the jurisdiction of the commission to hear and determine the application. In arguing these demurrers, counsel cited the franchise contracts between the applicant company and these political subdivisions which reserve the subject of fare revision for adjustment by the parties. It was further alleged that these contracts stripped the commission of jurisdiction in any differences which might arise between the parties.

The commission held that the demurrers were not well taken. The opinion of the commission was that the statutes confer upon it exclusively, jurisdiction to authorize the abandonment of public utility facilities.

The company contended that for the past four years the operation of its system has been carried on at an actual out-of-pocket loss. Moreover, during this period, the officials of the company pointed out, maintenance has been deferred to almost the danger line. On its part, the commission said that the evidence was to the effect that during this period of time the company operating this division had adopted every feasible and practical method of encompassing economies.

The evidence as to the revenues is summarized in the following table:

In its finding the commission pointed out that these figures show there is nothing set aside for the deferred maintenance or depreciation accounts and no balance available for a return on the property.

The commission also pointed out that the line traverses a territory which has had a steady and continuous growth in the last ten years, but that the revenue and traffic of the company during this period, especially in the last four years, has steadily decreased. It ascribes the condition confronting the company as doubtless due to the general use of the privately-owned automobiles.

Counsel for the municipalities developed the fact that the revenues as reported did not include the receipts from a coach line which parallels the railway. This property, the commission found, was held in the name of a separate company. As respects this bus operation, the witnesses asserted that it was experimental and that no definite conclusions were yet possible. The commission pointed out that the service operated along this route is not comparable to the applicant's service, and that rates are collected practically double these charged by the traction company.

The main contention of the municipalities, aside from that of lack of jurisdiction on the part of the commission, was that the applicant company should negotiate such adjustments in its fares as would enable the retention of the service. The opinion of the commission on this point was that the following question and answer from the record sum up this situation:

> Q. Is it possible, Mr. MacCalla (the vice-president and general manager of the applicant company), under any rate of fare that would be practicable, for that company to make a fair return or a substantial return upon the amount invested in the tracks and property?
>
> A. I believe such a rate as would theoretically do that would have the effect of decreasing the traffic and actually defeating the object aimed at. In other words, I do not believe it is possible to put a rate in there which would give a reasonable return on the capital after taking care of operating expenses and necessary reserves for replacements.

There was some question in the record as to the good faith of the owners of this property in segregating it. On this point the commission said that the city of Youngstown some time since contracted with the operators of the properties for the segregation of the so-called Youngstown Municipal Railway and that the normal procedure for the owners was to segregate the property involved in the present proceeding under a distinct ownership. In concluding its opinion in the case the commission said:

> Having regard for the fact that a common carrier of persons should be financially responsible for the transportation of the people who entrust themselves to it, we must conclude that the welfare of the public will best be served by the abandonment of this line, which is consuming its own capital to maintain its service.

Only 8 per Cent Dividend in New Orleans Authorized

R. S. Hecht, president of the Public Service, Inc., New Orleans, La., has taken occasion to reply to statements made from other than company sources as to the probable course the company will take in the matter of declaring dividends upon its present common stock and the probable issuance of the additional stock, etc.

Mr. Hecht says that at no time has his company considered paying a dividend of more than 8 per cent on the present common stock. Further, the agreement between the company and the city does not authorize a dividend of more than 8 per cent. In fact, money in excess of the amount needed for dividends must be put back into the company. Mr. Hecht said that this process must continue for a period of five years.

With respect to the company's needing more money, Mr. Hecht said it would probably have to have new money each year for several years.

At the meeting of the board of directors in January the budget and program for 1924 will be decided. At the same time the method will be determined by which additional financing can be carried out.

He said the company was spending the new money as advantageously as possible, and that all of the expenditures were calculated to increase efficiency and reduce the cost of operations, which of course would work toward a reduction in fares.

Commissioner Maloney says that the matter of refinancing the New Orleans Public Service, Inc., is not now before the Commission Council. He indicated that the question now up for settlement between the company and the city is the one of the additions that should properly be permitted to be made by the company to the rate base as agreed upon by the company and the city as the point from which the start was made when the present operating arrangement was put into effect.

Abandonment of Alameda Line Approved

Holding that the service on the Fourteenth Street-Alameda Pier suburban line of the Southern Pacific Company is a duplication of the service furnished via the Seventh Street line and the Eighteenth Street line to the Oakland Pier, the California Railroad Commission on Dec. 8 authorized Southern Pacific Company to cease the operation of the Fourteenth Street-Alameda Pier suburban service or the crosstown Oakland-Alameda line on Dec. 27.

The Southern Pacific Company operates across the Harrison Street Bridge a suburban service between Fourteenth Street, Oakland, and the Alameda Pier, also a street car service from the Sixteenth Station, Oakland, into Alameda. It was shown that the company has been operating both these lines at a loss for several years.

The commission found that the public is also served by the Twelfth Street line of the San Francisco-Oakland Terminal Railways, and the Southern Pacific Company crosstown service from Oakland to Alameda is also duplicated by service through this territory by the San Francisco-Oakland Terminal Railways.

The commission found that there is at present an economic waste in the maintenance of these lines by the Southern Pacific Company and that further capital expenditures for a new bridge to permit continued operation over the Estuary cannot be justified. In addition to authorizing the suspension of this service the commission directed the Southern Pacific Company to secure from the cities of Oakland and Alameda the necessary authority, if any be required, to relinquish franchises under which these lines are now being operated.

Consolidation of Philadelphia Companies Urged

Joseph Gilfillan, a director of the Union Traction Company, Philadelphia, who represents a large stockholding interest of the company, has sent a letter to the president and directors of the Union Traction Company, Philadelphia Rapid Transit and the Philadelphia Traction Company, looking to a consolidation of the transit companies of Philadelphia. He points out that any plan looking to the simplification of the present corporate structure should be in the direction of a consolidated ownership of all lines in one corporation.

In the exchange of securities involved, he says, the stock of underlying companies, which own the tracks and franchises would be represented by a first mortgage bond issue secured upon these properties, while the shares which represent the money heretofore successfully spent in the improvement of these properties would be represented by first and second preferred stock, leaving to present operating company, the Philadelphia Rapid Transit Company, the common stock interest and the control and management of the system. It is pointed out that the lines in consolidated ownership would amply secure a sufficient bond issue to finance the consolidation.

More Funds for Railway

New Jersey Road Would Sell Terminal and So Secure Money for Railway Business

Sale of the Public Service Terminal in Park Place, Newark, by the Public Service Railway to the Public Service Corporation is proposed in an application for approval filed with the Public Utility Commission. The application indicates a plan to enlarge the terminal, which the railway is not in a position to do because of lack of available funds. In fact, construction of a seven-story addition to the building has already begun.

The purchase price stipulated in resolutions adopted by the directors of the railway is $2,500,000 subject to a mortgage of $5,000,000 executed by the Public Service Newark Terminal Railway, formed to build the terminal, and subsequently merged with the Public Service Railway.

Upon confirmation of the proposed sale the agreement between the associated corporations contemplates a renewal of the fifty-year lease, under which the Public Service Railway rented certain space, including the concourse, offices and space occupied by the railway tracks, at an annual rental of $330,240.

The application sets forth that occupants of the terminal, which include the Public Service Gas Company and the Public Service Electric Company, desire additional office space and that the railway deems it inadvisable, if it had the available funds, which it has not, to make the necessary capital investment for the enlargement. The application sets forth further that:

> Such sale will put the property in the possession of an owner which can advantageously make such enlargement, and will in addition thereto put your petitioners (Public Service Railway) in possession of considerable funds to assist it in and about its railway business.

Upon the merger of the Public Service Newark Terminal Company and the Public Service Railway in 1915 the lease between the two companies was canceled, the railway becoming the owner instead of the lessee of the terminal property. The present proposition contemplates the revival of this lease for the remainder of the fifty-year period for which it was originally drawn, the Public Service Corporation instead of the terminal company becoming the owner and lessor.

The annual rental under the terms of the revived lease will remain at $330,240 until 1965, at which time it may be renewed at the option of the railway on terms to be agreed upon. In the event of a disagreement the rental terms would be settled by arbiters, one chosen by the Public Service Corporation, one by the Public Service Railway and the third by the two already chosen.

Auction Sales in New York

At the public auction rooms of A. H. Muller & Sons, New York, the following securities were sold on Dec. 19:

392 shares New York Railways Company, $1 lot.

250 shares Buffalo & Lake Erie Traction, common, $8 lot; 250 shares of preferred, $80 lot, and $50,000 first mortgage 5 per cent bonds, 10½ per cent.

$2,000 New York Railways 4 per cent first mortgage bonds, due 1942, $300 lot.

457 shares Aurora, Elgin & Chicago Railroad common, $100 each, $3 lot.

333 shares Western Ohio Railroad certificates of deposit, $100 each, $6 lot.

$1,000 Nashville Railway & Light Company cons. 5 per cent bonds, due 1953, 84½ per cent.

100 shares Interborough Consolidated Corporation preferred, $100 each, $8 lot.

80 shares Brooklyn Rapid Transit Company (old stock), $1 lot.

$2,100 Olean, Bradford & Salamanca Railway first and refunding 7 per cent bonds, due 1951, $50 lot; 105 shares preferred, $7 lot, and 252 shares common, $2 lot.

Trustee Appointed.—George M. Bryne of Winchester, Mass., has been appointed by Governor Cox to the position of trustee of the Eastern Massachusetts Street Railway, to succeed the late Samuel W. McCall, who lived in the same city. Mr. Byrne is a member of the firm of George M. Bryne & Company, builders and contractors, and has been chairman of the Winchester Board of Selectmen for a number of years.

Line Sold.—The Southwestern Traction Company, which operates between Belton and Temple, Tex., has been sold at trustee sale for $15,000 and the assumption of the taxes and paving obligations that are outstanding against the company. It was bid in by J. C. Houser, present manager of the company, for himself and H. H. Hamilton of New York City. They will try to operate the line and make needed improvements to its track and equipment. The line was built in 1903.

$712,000 Equipment Trust Authorized.—The San Diego Electric Railway, San Diego, Cal., has been authorized by the California Railroad Commission to execute and enter into an equipment trust agreement and second mortgage, guaranteeing payment of $712,000 of 6 per cent equipment trust certificates recently authorized by the Railroad Commission to cover the cost of a large amount of electric railway equipment.

To Pay Interest.—Samuel D. Tuell, receiver of the Houghton Traction Company, Houghton, Mich., notified the Old Colony Trust Company, trustee, Boston, that pursuant to the order from the United States District Court for the Northern Division of the Western District of Michigan, under date of Nov. 26 last, he would pay the coupon interest on Dec. 15 which became due Jan. 1, 1923, on the first mortgage 5 per cent gold bonds dated Oct. 1, 1908. Payment will be made with interest on overdue interest from Jan. 1, 1923, up to Dec. 15, at the rate of 5 per cent per annum.

Traffic and Transportation

Higher Fare in Cincinnati on Jan. 1

Formal announcement of an increase of ½ cent in fares was made by the Cincinnati Traction Company on Dec. 15. The new fare, 8½ cents, will become effective Jan. 1. Preliminary reports of the receipts and expenditures of the company for October and November made to William Jerome Kuertz, Director of Street Railways, left no room for doubt that the fare would be increased. Walter Draper, vice-president of the traction company, said that the increase was necessary to meet the company's obligation to pay the city franchise tax. During the past three years the franchise tax has not been considered as a factor in rate making, since under the terms of the franchise the tax is not to be paid unless earned. By consent of the traction company and City Council the obligation to the city was suspended provided that rates would not be increased. That action was taken upon the ground that it would be unfair to the car riders to have the tax continued as a factor where it could not be paid since it had not been earned by the company. Last September, however, the company gave notice of an increase from 7½ to 8 cents effective on Oct. 1, and immediately the provision of the franchise relating to the city tax again became operative.

Favor Change in Night Service in Boston

The Boston Elevated Railway has tried a new method to ascertain the will of the people regarding the operation of its cars in night service, in which the company made a change some time ago. All-night service into Tremont Street subway in Boston was started Oct. 14. Later workers presented petitions claiming that only those who worked in the neighborhood of Scollay Square, Park Street and Boylston Street stations were at all benefited by the new order. All the others who were used to getting the cars at their doors were forced to walk. It was their contention that conditions would be improved if the old service were restored, because most of the employees, tired after a night's work, might go from their work to the street and get the car without the necessity of a long walk.

The trustees refused the petition, but Chairman Jackson at the time said that the decision was not final and that the experiment would be given a fair trial. The latest move on the part of the company has been to submit the question to a vote by the users of the night cars, and it says it will abide by the results. Ballots were handed out to all the riders one day with instructions for marking crosses against the plan preferred. Of 3,663 votes cast, 1,747 were for the plan to which a change had been made and 1,535 were for the old plan. In this test 247 of the riders stated affirmatively that they had no choice and 134 returned the ballots without marking them in any way.

Fare Injunction Denied to City of Ottumwa

The injunction suit brought by the city of Ottumwa against the Ottumwa Railway & Light Company has dragged its way to a conclusion in the courts. The injunction has been denied by the Supreme Court of the State. The 7-cent fare is held to be legal and just, and all that remains is for the costs to be assessed.

In commenting on the case the Ottumwa *Courier* said:

> It is not difficult to recall that the suit against the company was inherited by the present city administration from the last Leeny régime, and it is not difficult to recall the circumstances under which the fight originated. An effort was made to compel the company to provide service at a rate which involved a loss. If the courts had ordered compliance there could have been but one of two results. Either the company would have been forced into a receiver's hands eventually, or the rates for electric service and steam heating would have been increased to a point at which the resulting revenues would have wiped out the deficit from railway operation.
>
> If a community must have street cars—and every going community needs them—it must provide a revenue sufficient to justify investors in financing a railway or it must tax itself to pay for the upkeep of its own system.

Fare Validity in Milwaukee Questioned

Basing his plea on the recent decision of the United States Supreme Court in the case of the Superior Water, Light & Power Company, of Superior, Wis., a Socialist Alderman of Milwaukee has presented to the Common Council for its approval a resolution requesting that the city attorney take steps to determine whether or not the Milwaukee Electric Railway & Light Company is at present illegally charging a cash fare of 7 cents instead of 5 cents in contradiction to a franchise ordinance passed by the Common Council in 1900 which was to endure until Dec. 31, 1934.

Interpreting the Superior decision as it applies to the Milwaukee situation, it is obvious that the fare set forth in the 1900 franchise is binding and that the Wisconsin Railroad Commission had no power or authority to alter the rates. The Wisconsin Supreme Court, however, has repeatedly decided that control of rates passed to the Railroad Commission, when state utilities were placed under its jurisdiction.

In the case of the Superior Water, Light & Power Company the United States Supreme Court decided against the State Supreme Court and the city in the methods adopted to acquire by condemnation proceedings the electric, gas and water plants of the Superior Water, Light & Power Company by terms other than those specified in the franchise, which were in accordance with the Wisconsin Public Utilities act of 1907. In upholding the company the court asserted that the franchise and its amendments constituted a valid contract, not subject to abrogation by the state public utilities act.

Adopts Weekly Pass.—The Geneva, Seneca Falls & Auburn Railroad, Geneva, N. Y., has started the sale of weekly pass tickets at $1 each. Tickets are good for unlimited trips for seven days, commencing Monday of each week, on all Geneva city line cars and on interurban cars in Geneva and east to and including Lake Road stop.

Change Made in Ticket Use.—Regulations governing the sale and use of the forty-six-ride school commutation ticket books for use on the lines of the Albany Southern Railroad, Rensselear, N. Y., have been changed to provide that on and after July 1, 1924, the time limit on such tickets will be fifty days from date of sale, instead of within the school year in which purchased as at present. The use of school tickets will be confined to pupils and teachers traveling to attend schools where sessions are held at least five days each week.

Fare Hearing Adjourned.—Hearing on the application of the Detroit United Railway to the Michigan Public Utilities Commission for permission to increase its rate of fare from 2 cents to 2½ cents a mile was recently adjourned. It was brought out in the testimony at the hearing on Dec. 17 that the Detroit United Railway had lost more than $1,000,000 in the last nine months, part of which was due to a $500,000 annual increase in wages of employees. It is contended that the line had also suffered considerably from bus competition. The company claims that in order to earn a 7 per cent return upon the utility commission's valuation of $26,691,320, the rate of fare would have to be raised to 2½ cents a mile. Company officials agreed, however, to issue commutation tickets at reduced rates.

Service Restored.—After a trial period of a month and a half in which less frequent schedules were in effect, the Clinton, Davenport & Muscatine Railway will shortly restore the hour and one-half service on its interurban line to Muscatine, Iowa.

Illness Delays Decision.—Serious illness of Mrs. Henry A. Dubbs, wife of Henry A. Dubbs, Master in Chancery, who heard the pleas of the city of Denver attorneys and that of the Denver Tramway relative to the 6-cent fare, prevents the Judge from taking an active part just now and the decision that was expected some time during December will most likely not be given until after the New Year.

Personal Items

D. C. Green Named Manager of Utah Traction

D. C. Green, formerly vice-president and general manager of the Fort Smith Light & Traction Company of Arkansas, has been named vice-president and general manager of the Utah Power & Light Company and vice-president of the Utah Light & Traction Company, Salt Lake City. He succeeds S. R. Inch, who has accepted an important position with the Electric Bond & Share Company in New York. Mr. Green has had a wide experience in the management of electric and gas utilities. Early in 1915 Mr. Green came from the northwest to Salt Lake City as manager of the Salt Lake division of the Utah Power & Light Company. He left Salt Lake City in the fall of 1916, and since that time has been associated with various utilities in a managerial capacity.

The change will not sever Mr. Inch's connection with the Utah companies, since he remains a vice-president and director of both. Mr. Inch first came to the Utah Power & Light Company as general superintendent early in 1913. In January, 1918, he succeeded C. E. Groesbeck as vice-president and general manager of the Utah Power & Light Company and vice-president of the Utah Light & Traction Company.

Joseph T. Hissem, who has been secretary of the Galna (Ill.) Chamber of Commerce and secretary of the Galena Red Star Merchants' Association, has taken a position as auditor in the general offices of the Northern States Power Company, at Minneapolis.

B. E. Bramble, Champaign, Ill., for many years auditor of the Illinois Traction System, has been appointed comptroller of the North American Light & Power Company, according to an announcement made by William A. Baehr, president of the company. Mr. Bramble will divide his time between the Chicago and Champaign offices of the company.

Arthur P. Russell, vice-president of the New York, New Haven & Hartford Railroad, with headquarters at Boston and New Haven, has in addition to his present duties assumed jurisdiction of public relations and publicity. He will now have charge of matters tending to promote harmonious relations between the company and the public and will supervise the preparation of general information to be issued by the management.

Thomas F. Kennedy has recently been appointed new-business manager of all of the Cities Service properties, with headquarters in New York City. His connection with the Doherty interests started in 1901, when he joined the Denver Gas & Electric Light Company as a meter reader. Since then he has been steadily advancing until in 1920 he was selected as manager of the new-business department of the Western Light & Power Company, with headquarters in Boulder, Col. In July, 1922, he came to New York as assistant to George Williams, whom he now succeeds as head of the new-business work of the Doherty organization.

Mr. Arnold Joins North Shore

Eastern Wisconsin Electric Official Will Have Charge of Buses Used by Interurban

B. W. Arnold

Bert Arnold, Oshkosh, has been called to the post of manager of the motor coach department of the Chicago, North Shore & Milwaukee Railroad, effective Jan. 1. He will have his headquarters at Milwaukee and will report to C. E. Thompson, assistant to the president. Mr. Arnold will have charge of the operation of the motor coach lines of the company and of the expansion of this service.

To the railway men in the Wisconsin territory Bert Arnold is familiarly known as the Wizard of Oshkosh. He is at present manager of railways of the Eastern Wisconsin Electric Company, with jurisdiction over the local properties in Oshkosh, Fond du Lac and Sheboygan and the interurban line between Neenah and Oshkosh. It may sound like overdoing the thing to say that Mr. Arnold knows everybody and everything in the territory in which his company operates, but the statement is substantially true. It is just about six years ago that Mr. Arnold went to Oshkosh. At that time public relations were anything but good and the physical property of the company was somewhat below par. All this Mr. Arnold has corrected. As for co-operation, even the independent bus men use the railway station as a terminal at his suggestion. He demanded a square deal at the hands of the local papers and he has got it. It was Bert Arnold who in 1922 put across in magnificent shape the first separate convention of traction men in Wisconsin.

Mr. Arnold brought to the position at Oshkosh a background of wide experience in railway work. He entered the field in 1899 with the Wheeling & Lake Erie Railway. Next he was dispatcher of the Lake Shore Electric Railway, Cleveland, Ohio, and chief dispatcher of the Muncie, Hartford & Fort Wayne Railway, Muncie, Ind. In 1907 he became superintendent of the southern division of the Illinois Traction System. From his headquarters with that company at Springfield he was transferred to Decatur as superintendent of all lines entering that city, and later was made chief clerk to the general superintendent of the system. In 1910 he was made superintendent of transportation of the Chicago, Ottawa & Peoria Railway. In 1917 he joined the Eastern Wisconsin Electric Company. The career and the work of Mr. Arnold were reviewed at length in the ELECTRIC RAILWAY JOURNAL, issue of Sept. 9, 1922.

Obituary

Charles Frankel, president of the Frankel Solderless Connector Company, New York, died suddenly on Dec. 18. Mr. Frankel was sixty-one years of age. He was an outstanding figure in electrical manufacturing activities and was prominent in civic affairs.

F. B. Myers, former president of the Cleveland, Southwestern & Columbus Railway, Cleveland, died in Ashland, Ohio, on Dec. 3. He was a director of the Nickel Plate Railroad and of the Union Trust Company, Cleveland, and had other interests. Early in 1921 he resigned as president of the Cleveland, Southwestern & Columbus Railway, so as to give his entire attention to the Ashland Pump & Hay Tool Works and the Faultless Rubber Company. Mr. Myers was seventy-four years old.

Ralph E. Gilman, special engineer in charge of turbo-generator engineering of the Westinghouse Electric & Manufacturing Company, died in Los Angeles on Dec. 5. Mr. Gilman was graduated from the Leland Stanford, Jr., University, Palo Alto, Cal., receiving his E.E. degree in 1898. He entered the employ of the Westinghouse company immediately after his graduation and completed the apprentice course of the company in January, 1901. The next two years he was located in the engineering department. In 1903 he was transferred to the British Westinghouse Company and spent the next five years in London, England. In 1908 Mr. Gilman was recalled to East Pittsburgh and assigned to special duties in the power engineering department. He was in this department continuously until the time of his death.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Philippine Mahogany Trim

Lighter than Birch and as Cheap as Cherry—Location of Market Affects Price

A departure from usual car building practice is embodied in the plan of the Chicago Surface Lines to use Philippine mahogany instead of birch or cherry for its interior car trim on account of its lightness and fine appearance. Although this wood is exported under the trade name of "Philippine mahogany," its proper designation is "red lauan." Quarter sawn, it has a beautiful ribbon grain, which, with its dark reddish-brown color, makes it useful for interior finish, furniture, etc. Whether or not it is superior to cherry in appearance is largely a matter of taste. Birch in its natural state is not particularly beautiful, but it possesses properties which make it possible to stain it to resemble almost any hard wood.

In weight, red lauan possesses advantage over birch and a slight advantage over cherry. The weights of the various woods at about 8 per cent moisture content, which is approximating the condition under which the material is used in interior car trim, are: birch, 42 lb. per cu.ft.; black cherry, 34 lb. per cu.ft.; Philippine mahogany, 33 lb. per cu.ft.

QUANTITIES OF TIMBER AVAILABLE

Because they are grown over such wide areas, it is difficult to estimate the exact amounts of these three woods which are available for commercial purposes. According to official estimates, however, there is in the United States about 19,000,000,000 ft. b.m of birch of all kinds and 500,000,000 ft. b.m. of cherry. A commercial handbook prepared in connection with the Commercial and Industrial Fair held in Manila last February makes the statement that there are in the Philippines 192,000,000,000 ft. b.m. of the woods of the *dipterocarp* family, which includes Philippine mahogany.

Birch is the cheapest of the three woods. Recent prices prevailing in New York City for red birch varied from $90 to $145 per 1,000 ft. b.m. and for white birch from $85 to $130 per 1,000 ft. b.m. The price of cherry varies from $90 to $180, depending on the quality. Philippine mahogany costs from $150 to $170 per 1,000 ft. b.m., depending on its freedom from pin worm holes, its color, etc. In the matter of price, therefore, the advantage is plainly with birch.

An item which should receive consideration in connection with the price of Philippine mahogany is the fact that this wood is likely to have many small pin holes. This is not considered technically to constitute a defect in the wood, and there is, therefore, no way for the purchaser to guard against this fault. Even the best grades of this wood have pin worm holes, and it is necessary to fill them and then rub off the surface with a cloth. The operation is quickly performed and does not greatly affect the cost, but the necessity for it should receive due consideration when Philippine mahogany is compared with birch and cherry, which do not require filling and polishing.

If an inland market is considered instead of that of New York City, the price differential in favor of birch increases, because that wood is available on short haul from the Lake states. In that region cherry is on an even basis with mahogany, because of the freight rates for the latter from the seaport to the interior. For example, birch was quoted on the Chicago market as late as Dec. 7 at prices from $60 for the poorer grades to $130 for the higher grades. This is approximately a third less than the New York price quoted in the earlier paragraph. In fact, for all cities other than seaports, Philippine mahogany would be at a disadvantage because it would necessarily bear the expense of railroad freight haul, as well as ocean freight. Birch is grown in the Appalachian Mountain region and for that section of the country has therefore comparatively short freight hauls. A large proportion of the cherry produced in this country comes from the same territory and would enjoy the same advantage.

Lumber Production at High Level All Year

Lumber production in the United States based on figures collected by the Department of Commerce has averaged more than 230,000,000 ft. b.m. per week since April 1. The largest production in a single week was for the seven days ending Nov. 10, when the maximum of 241,000,000 ft. b.m. was attained. Since that time there has been a slight falling off with the week ending Dec. 1, showing a production of only 225,000,000 ft. b.m. The week ending Dec. 8, however, showed an improvement with a production of 232,000,000 ft. b.m.

The rate of production for the year 1923 is well above that of the last few years. In 1922 the average weekly production was below 200,000,000 ft. and in 1921 it was below 150,000,000. The years 1919 and 1920 were nearly identical with an average weekly production of 171,000,000 and 173,000,000 ft. b.m.

Big Business Expected by Westinghouse Company

Present business bookings of the Westinghouse Electric & Manufacturing Company indicate good results for the second half of the fiscal year. For the first six months of the fiscal year through Sept. 30 the earnings were substantially equal to a full year's aggregate preferred and common dividend requirements. It is expected that operations for the first eight months of the year will show a net available for dividends running between $14,000,000 and $15,000,000.

The company is experiencing a resumption of business activity approaching spring and early summer levels, which is keeping the plant operations at capacity. Unfilled orders now approximate $75,000,000. The company is making an effort to reduce unfilled orders, in order to make delivery on contracts and take care more efficiently of business offered. The Philadelphia and East Pittsburgh plants are operating day and night. The outlook continues satisfactory and the sales department states that there is no indication of slackening in forward business. Bookings in November were larger than in October, which in turn exceeded the September total of $10,600,000. Indications are that the total for the year will probably be as large as last year, when the amount received was $152,328,564.

Canadian Control Obtained by General Electric

The General Electric Company has secured control of the Canadian General Electric, approximately two-thirds of the total $10,800,000 outstanding common stock of the Canadian company having been deposited with it.

As was noted in the ELECTRIC RAILWAY JOURNAL, issue of Oct. 27, the directors of both the American and Canadian companies approved the offer of the General Electric Company to purchase the common stock of the Canadian General Electric. Under the plan common stockholders of the Canadian company were offered $62.50 cash and one share of new $50 par value 7 per cent cumulative preferred stock of the Canadian company for each share of the common.

Metal, Coal and Material Prices

Metals—New York	Dec. 18, 1923
Copper, electrolytic, cents per lb.	13.125
Copper wire base, cents per lb.	15.75
Lead, cents per lb.	7.35
Zinc, cents per lb.	6.52
Tin, Straits, cents per lb.	47.125
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.425
Somerset mine run, Boston, net tons	2.175
Pittsburgh mine run, Pittsburgh, net tons	2.05
Franklin, Ill., screenings, Chicago, net tons	1.975
Central, Ill., screenings, Chicago, net tons	1.50
Kansas screenings, Kansas City, net tons	2.00
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$6.65
Weatherproof wire base, N. Y., cents per lb.	17.50
Cement, Chicago net prices, without bags	$2.10
Linseed oil (5-bbl. lots), N. Y., per gal.	$0.93
White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots	11.25
Turpentine, (bbl. lots), N. Y., per gal.	$0.935

Steel Sales Below Normal Capacity

A survey by the Department of Commerce of the present capacity of the structural steel fabricating industry in the United States indicates that the normal capacity is about 250,000 tons per month. In no month of the present year, however, has the actual tonnage booked closely approached the capacity. The tonnage in March was 235,000, or about 94 per cent of the shop capacity. April was slightly lower, and since that time the figure has been running at about 50 per cent.

Booklet Describes Trade Terms

The recognized interpretation of trade terms and abbreviations as in use in the larger commercial countries is contained in a booklet just issued by the International Chamber of Commerce, at Paris. Copies of the publication, which is both in English and French, are being distributed among the American members of the International Chamber. Non-members in the United States may obtain copies through the secretary, American Section, International Chamber, at Washington.

Victoria Exhibit in Prospect

The Victoria Electrical Federation is planning an electrical exhibition to be held in Melbourne, Australia, during September, 1924. The federation hopes to cover the entire electrical industry, showing actual working models of the various types of apparatus, including machine, transport, lighting and other industrial equipment. The fair will last four weeks.

Rolling Stock

Interstate Public Service Company, Indianapolis, Ind., during 1923 ordered twenty new cars at a cost of approximately $250,000. This new equipment includes three club and dining cars, three sleepers, two motor express cars, three express trailers and ten live stock cars. This equipment will be built by the American Car & Foundry Company. Reference has been made previously in the ELECTRIC RAILWAY JOURNAL to a part of this order and elsewhere in this issue some of the equipment is described.

Twin City Rapid Transit Company, Minneapolis, Minn., rebuilt during 1923 seventy-five double-truck two-man cars into front exit cars.

Eastern Wisconsin Electric Company, Oshkosh, Wis., has purchased a snow plow.

Interborough Rapid Transit Company, New York, N. Y., has placed orders for 100 new steel motor cars with the American Car & Foundry Company for use in the subway in accordance with the order of the commission issued last August. The cars will cost $30,000 each, making a total expenditure of $3,000,000. According to the commission's order, these cars must be ready for operation in the fall of 1924. Under the plan the Interborough Rapid Transit Company, the Rapid Transit Subway Construction Company and the New York Trust Company, as trustees, have entered into an agreement providing for the issuance of $2,250,000 in equipment trust certificates, bearing 6½ per cent interest, and issued in $1,000 denominations. This is the second order for 100 cars which the Interborough has placed at the suggestion of the commission following the investigation of the service and facilities of the subway in 1922. The 100 trail cars ordered last year have been delivered and are now in daily service.

Track and Line

Madison Railways has been granted an extension of time from Dec. 1, 1923, to Oct. 1, 1924, in which to carry out the work of double-tracking University Avenue from Randall Avenue to Breese Terrace. The company is now confronted with the immense improvement program of first finishing up the work on Breese Terrace next spring followed by the double-tracking of University Avenue, improving its East Johnson Street line and extending its line on Monroe Street from Harrison Street to Crandall Street.

New York State Railways has completed the Court Street extension to the works of the Onondaga Pottery Company. The men employed at the pottery plant formerly were compelled to walk nearly half a mile at either end of the day.

Shreveport Railways contemplates adding 3,000 ft. of new track to its line within the near future, according to H. B. Hearn, president. Arrangements for a right of way have been completed for the Jewelin Extension of the Fair Grounds Highland car and an ordinance has been prepared calling for a special election to be presented to the City Council of Shreveport within the week, authorizing the granting of a franchise. The new terminal will reach the city limits and will extend along the Fair Grounds property, paralleling Greenwood Road, thence to Jewelin Road.

New York, N. Y.—The American Bridge Company, a subsidiary of the United States Steel Corporation, has received a contract for 4,400 tons of steel for subway route 52 in Queens.

Walla Walla Valley Traction Company, Walla Walla, Wash., will build a branch line from Freewater to Umapine, at a cost of $100,000. The Oregon-Washington Railroad will have running rights over the line and will share in its construction.

Eastern Wisconsin Electric Company, Oshkosh, Wis., will spend $5,624 in co-operating with officials of Oshkosh in completing one of the most extensive street improvement programs ever undertaken, which will be started in the spring of 1924 on nine of the principal streets of the city, estimated to cost around $124,000. The company will pay $2,317 as its share of paving work on Merritt Street from Linde Avenue to Evans Street and $3,307 on West New York Avenue from Jackson Drive to the west side of Elmwood Avenue.

Pacific Electric Railway, Los Angeles, Cal., has been authorized to extend its Second Street car service in Long Beach to Alamitos Bay and Maples. Work will be started within the next month.

New Advertising Literature

Truscon Steel Company, Youngstown, Ohio, has issued in pamphlet form "Reinforcement in Concrete Roads Worth Its Cost." This is a reprint from *Engineering News-Record* of Nov. 15, by H. Eltinge Breed, consulting highway engineer, New York.

Silent Hoist Company, New York, N. Y., has issued Bulletin No. 22 descriptive and illustrative of the Silent Hoist electric car puller. The bulletin briefly but comprehensively describes its design and construction, as well as its utility.

Johns - Pratt Company, Hartford, Conn., manufacturer of fuses, has issued a Christmastide folder extending the season's greetings.

Foamite-Childs Corporation, Utica, N. Y., fire protection engineers and manufacturers of all types of fire-fighting devices, has published a new sixteen-page illustrated booklet, "The Essentials of Self-Protection Against Fire." The booklet presents the whole subject of first-aid protection against fire in an unbiased manner. A large reference chart supplements the text with a complete tabulation of the characteristics of all types of chemical fire extinguishers. The booklet is attractively printed in the standard size, 5½ x 8½, for convenient filing and permanent reference. Copies may be had on request addressed to the company at Utica.

Reliance Electric & Engineering Company, Cleveland, Ohio, has issued an illustrated bulletin, No. 5018, which gives the complete details of the design and construction of Type AA Reliance induction motors.

Bridgeport Brass Company, Bridgeport, Conn., is proud of its home city. It has issued an attractively printed folder entitled "See and Know Bridgeport—The Park City. The Industrial Capital of Connecticut." Besides containing a map of the city, hints on what to do and where to go are featured for the traveler in the city. Even the motorists will find the pamphlet instructive, as it contains some general rules on traffic and parking. The folder contains many pretty pictures of beautiful homes and points of interest within the boundaries of Bridgeport.

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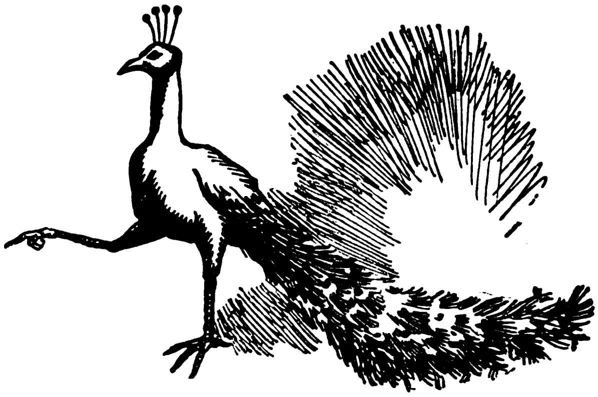

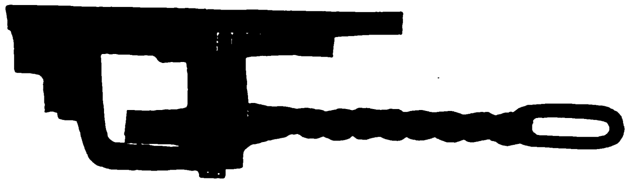

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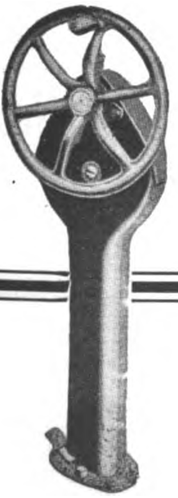

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When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

Isha

Among the mixed tribes in the Himalayas, a few beliefs are common to all
—one being that witches are everywhere
—vile creatures with long spotted tongues and long wild hair and long curved finger nails
—visible only to those gifted with second sight
—so that a person with proper outward appearance may still be a witch
—and the only test is to duck her in a pond (isha)
—for it is considered that a witch takes to water like a hen
—which prompts us to state that there are plenty of carbon brushes masquerading with the looks of Morganite
—but with inherent qualities to witch your commutation
—and you don't find it out until you have made the only test
—by putting them to work
—and then it's too late for economy or good service
—period.

Morganite Brush Co., Inc.

Main Office and Factory:
519 West 38th St., New York

DISTRICT ENGINEERS AND AGENTS
Pittsburgh, Electrical Engineering & Mfg. Co., 909 Penn Ave.
Cincinnati, Electrical Engineering & Mfg. Co., 607 Mercantile Library Building.
Cleveland, Electrical Engineering & Mfg. Co., 422 Union Building
Buffalo, Electrical Engineering & Mfg. Co., 409 Lafayette Building.
Philadelphia, Electric Power Equipment Corp., 412 North 18th St.
Baltimore, O. T. Hall, Sales Engineer, 1926 Edmondson Ave.
Revere, Mass., J. F. Drummey, 75 Pleasant Street
Los Angeles, Special Service Sales Co., 502 Delta Building.
San Francisco, Special Service Sales Co., 202 Russ Building.
Toronto, Can., Railway & Power Engineering Corp., Ltd., 131 Eastern Ave.

How the Dayton

3

The 1923 Committee on Way Matters of the A.E.R.A. reported at the Atlantic City convention as follows:

"It was agreed that a substitute tie should meet the following requirements:

1. Resiliency.	The fundamental principle of the **DAYTON RESILIENT TIE.**
2. Hold rail to gage.	Held securely by bolts accurately located in steel cross members.
3. Provide sufficient bearing area.	By protecting the concrete from breaking or pulverizing, the Dayton Tie converts the entire roadbed into bearing surface.
4. If expected to last for more than one set of rails, that easily renewable fastenings be provided.	Readily accessible bolt fastenings provide for rail renewal.
5. Be easily installed by ordinary track workers.	Eight ordinary track laborers, by actual test, have laid 1,000 feet of Dayton Resilient track in a single day.
6. Cost installed should be reasonable."	Dayton Resilient Tie Track costs $2,000 per mile less than wood ties in gravel ballast.

DAYTON

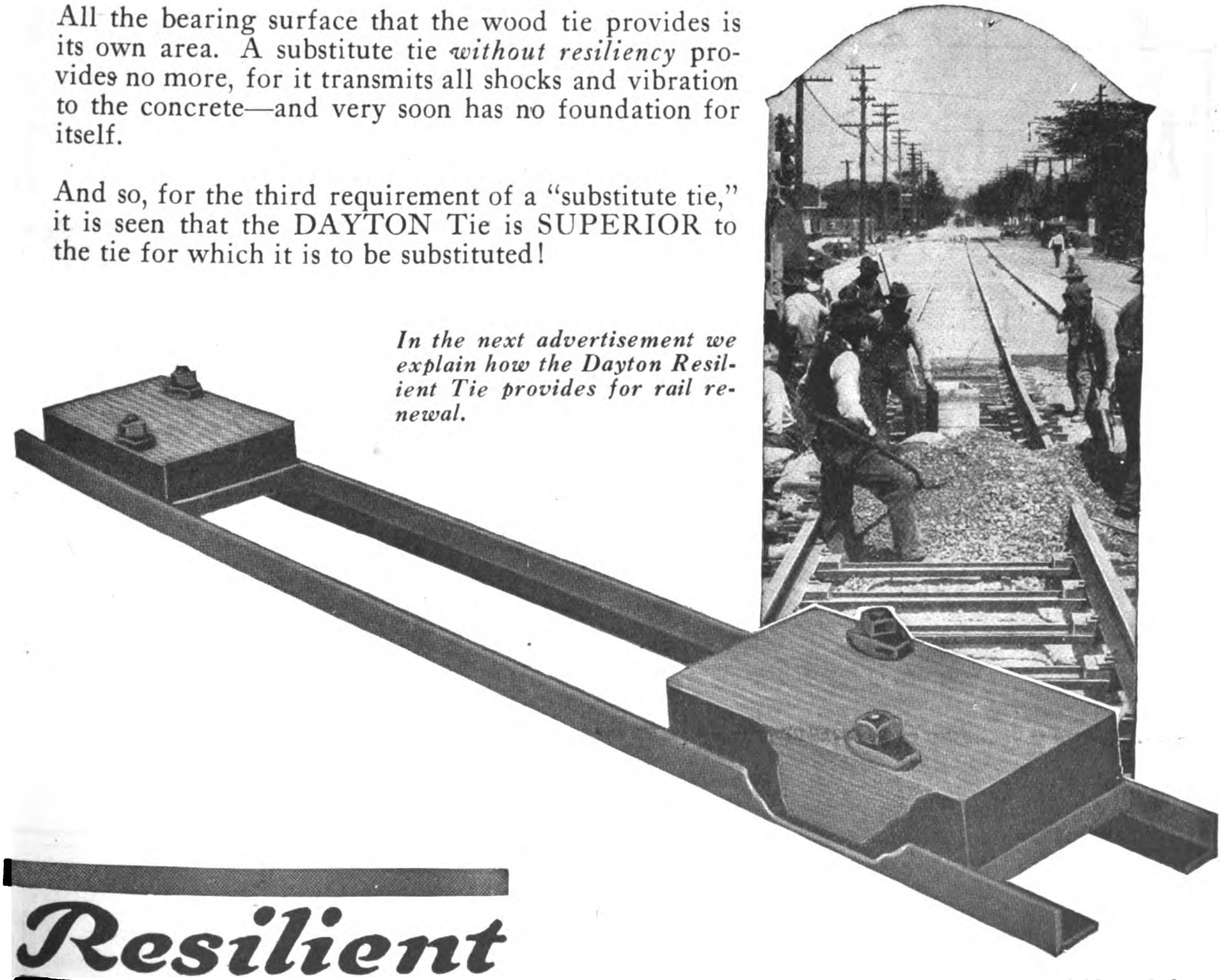
"Provides Sufficient Bearing Area"

By protecting the concrete from breaking or pulverizing the Dayton Resilient Tie converts the entire roadbed into bearing surface. The concrete is protected from shocks and vibration by the resilient feature of the Dayton Tie.

All the bearing surface that the wood tie provides is its own area. A substitute tie *without resiliency* provides no more, for it transmits all shocks and vibration to the concrete—and very soon has no foundation for itself.

And so, for the third requirement of a "substitute tie," it is seen that the DAYTON Tie is SUPERIOR to the tie for which it is to be substituted!

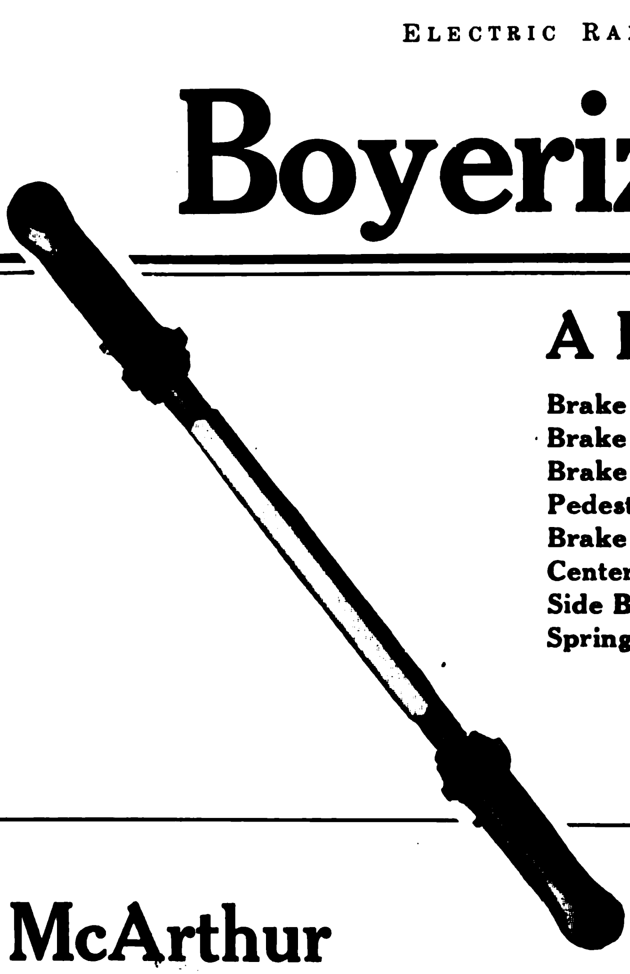
In the next advertisement we explain how the Dayton Resilient Tie provides for rail renewal.



Resilient TIE

THE DAYTON MECHANICAL TIE CO.
707 Commercial Bldg.
DAYTON, OHIO

Boyerized Parts!

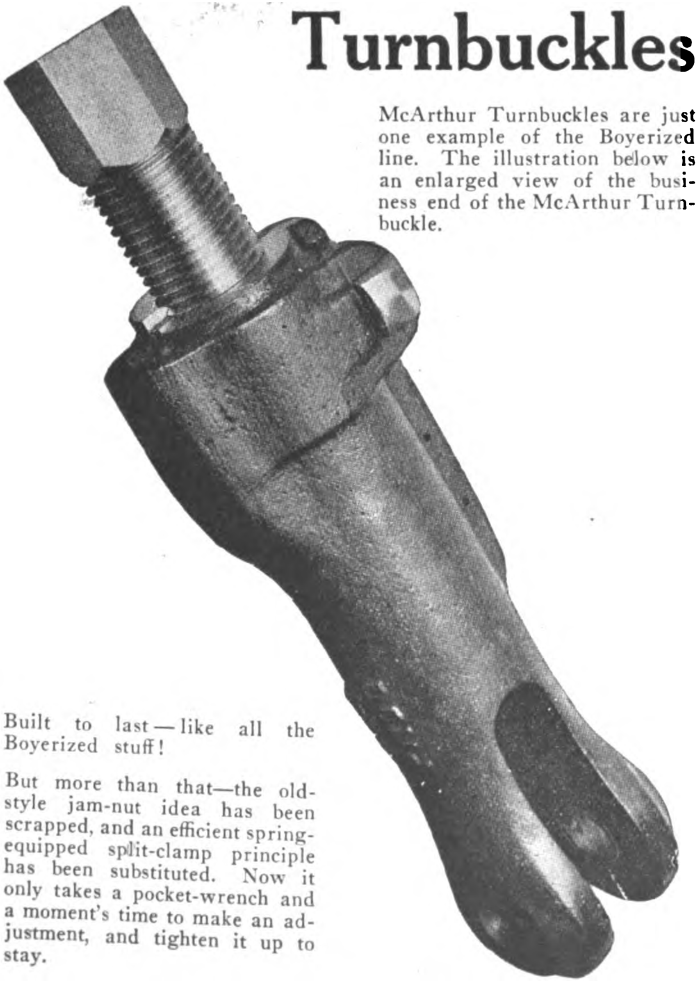


A List of Money Savers

Brake Pins
Brake Hangers
Brake Levers
Pedestal Gibs
Brake Fulcrums
Center Bearings
Side Bearings
Spring Post Bushings
Spring Posts
Bolster and Transom Chafing Plates
McArthur Turnbuckles
Manganese Brake Heads
Manganese Truck Parts
Bushings
Bronze Bearings

McArthur Turnbuckles

McArthur Turnbuckles are just one example of the Boyerized line. The illustration below is an enlarged view of the business end of the McArthur Turnbuckle.



Built to last—like all the Boyerized stuff!

But more than that—the old-style jam-nut idea has been scrapped, and an efficient spring-equipped split-clamp principle has been substituted. Now it only takes a pocket-wrench and a moment's time to make an adjustment, and tighten it up to stay.

because—

the Boyerizing process makes them last so much longer than the usual kind of equipment. Experience demonstrates it. Try them.

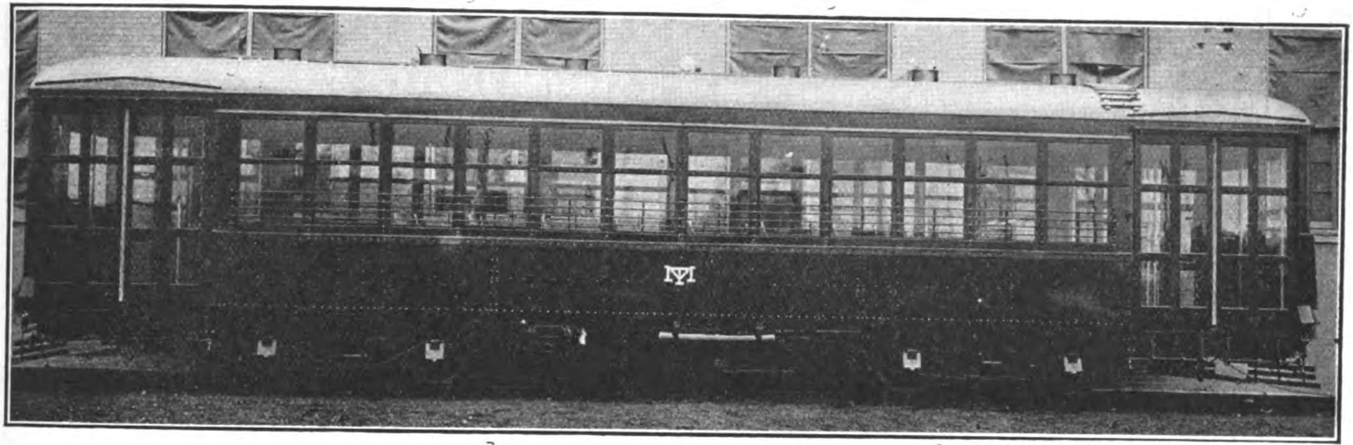
Bemis Car Truck Company

Electric Railway Supplies

Springfield, Mass.

Representatives:
Economy Electric Devices Co., Old Colony Bldg., Chicago, Ill.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKenney, 54 First Street, Portland, Ore.
J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.

The Universal Safety Car



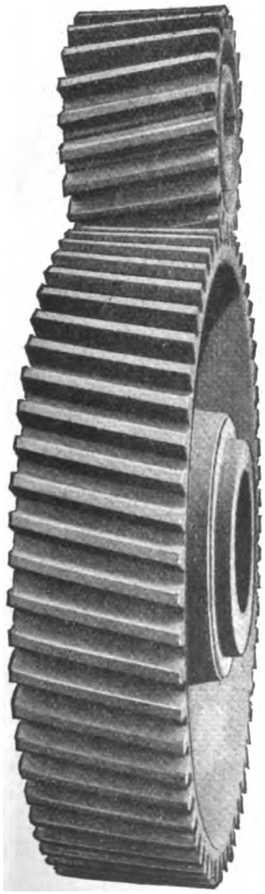
When we talk about efficient service in connection with the Universal Safety Car we don't speak of something that will be or that was, but that IS! These cars *are* giving the service that pleases passengers and keeps the company using them on the upgrade.

It's the proper balance between weight and strength that gives them the speed and the ability to stand up under all kinds of service. They are economical to operate, low in maintenance costs, and most reasonable in initial cost. Built for one and two-man operation.

Write for figures before buying new cars.

St. Louis Car Company, St. Louis, Mo.

"The Birthplace of the Safety Car"



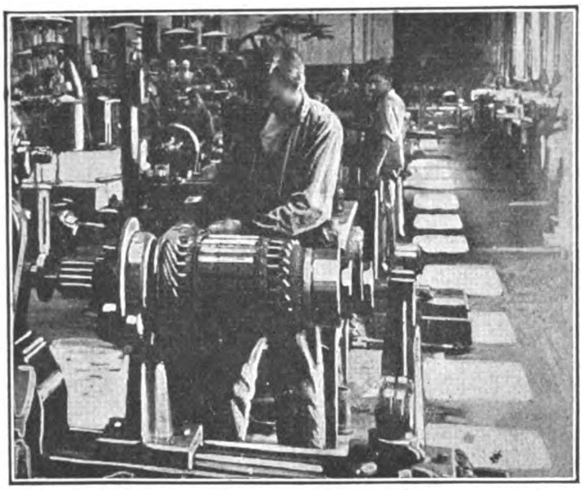
NO OTHER gear at any price assures you as good value for your money as the Nuttall BP Helical Gear. It saves your equipment, it saves 70% in gear cost and it lasts four times as long as any untreated gear.

Can you afford not to have BP Helicals on your equipment?

R.D. NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

Get better service from armatures with



IRVINGTON

Black Varnished Cambric

30% Higher Dielectric Strength
100% Better Heat Resistance
100% More Alkali and Acid Resistance
200% Better Aging Qualities
200% More Resistance to Oil
Than Yellow Varnished Cambric

Send for samples

Irvington Varnish & Insulator Co., Irvington, N. J.
ESTABLISHED 1905

Sales Representatives:

Mitchell-Rand Mfg. Co.
New York
Clapp & La Moree
Los Ang. & San Francisco, Cal.

Consumers Rubber Co.
Cleveland, O.
E. M. Wolcott
Rochester, N. Y.

L. L. Fleig & Co.
Chicago, Ill.
F. C. Scofield
Toronto, Ont., Canada

T. C. White Elec. Supply Co., St. Louis

Right After the Whistle Blows—

How many hundreds of people are depending on your lines to carry them to their homes? How many of them crowd into your cars?

They are in a hurry. They want speed and service! Do they get it?

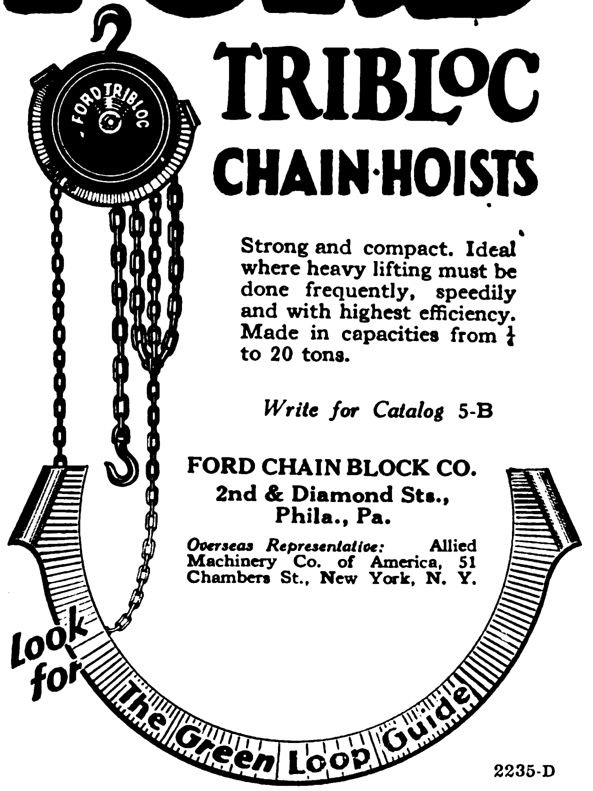
Globe Tickets and P. M. Coupon Transfers are helping many Electric Railway Operators to give patrons service at times like these.

NEW YORK STATE RAILWAYS
ROCHESTER LINES
ONE 7¢ FARE
965000

Nearly half a century of real experience in making tickets gives us the confidence to say that Globe Tickets will help you.

A word to the wise is sufficient. You can profit by all of our experience, if you will let us help you solve your ticket problems.

Globe Ticket Company, 116 N. 12th Street, Philadelphia, Pa.
Los Angeles **New York** **San Francisco**



FORD

TRIBLOC
CHAIN-HOISTS

Strong and compact. Ideal where heavy lifting must be done frequently, speedily and with highest efficiency. Made in capacities from ½ to 20 tons.

Write for Catalog 5-B

FORD CHAIN BLOCK CO.
2nd & Diamond Sts.,
Phila., Pa.

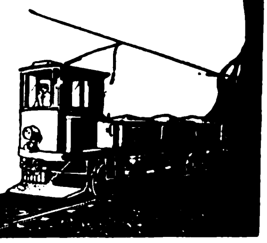
Overseas Representative: Allied Machinery Co. of America, 51 Chambers St., New York, N. Y.

2235-D

"Tool Steel" = Quality
guaranteed and proven
in

SPUR and HELICAL
gears and pinions.

The Tool Steel
Gear and Pinion Co.
CINCINNATI, O.



The Differential Car

An automatic dump car, an electric locomotive, a snow plow, and a freight car—all in one. Big savings shown in track construction and maintenance, paving work, coal hauling, ash disposal, snow removal, and freight transportation.

The Differential
Steel Car Co.
Findlay, Ohio

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CHARLES C. CASTLE, First Vice-President
HAROLD A. HEGEMAN, Vice-Pres. and Treas., and Acting Secy.
W. C. LINCOLN, Manager Sales and Engineering

National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., New York

BRANCH OFFICES:

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Hegeman-Castle Corporation, Railway Exchange Bldg., Chicago, Ill.

Tool Steel Gears and Pinions
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Genesco Paint Oils
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Anderson Slack Adjusters
Economy Electric Devices Co., Power Saving and Inspection Meters
Ft. Pitt Spring & Mfg. Co., Springs
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Garland Ventilators
E-Z Car Control Safety Devices
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Brake Shoes
A.E.R.A. Standards

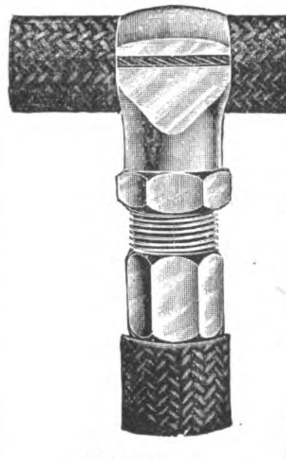
Diamond "S" Steel Back is the Best Type

Standard Patterns for

SAFETY CAR

D-67 for Narrow Treads
D-87 for Wide Treads

American Brake Shoe and Foundry Co.
30 Church Street, New York
332 So. Michigan Ave., Chicago Chattanooga, Tenn.



Connecting a branch to the main

How the big Power Co's do it

There is economy in making every electrical connection by the Dossert Solderless method—giving greater conductivity than the wire itself—and without the fuss, danger and damage to insulation that high heat imposes.

This is a DOSSERT SOLDERLESS Cable Tap

The Dossert 15th Year Book below illustrates and describes the services of the different connectors.

GET THIS BOOK

FREE

Dossert & Co.
242 West 41st Street
New York, N. Y.

DOSSERT
SOLDERLESS CONNECTORS
CATALOGUE FIFTEEN

The Baker Wood Preserving Company
CREOSOTERS
Washington Court House, Ohio

Cross Ties
Bridge Timbers
Lumber
Posts
Piling

Treated and Untreated

We solicit your inquiries

Creosoting Plant located
Washington Court House, Ohio
On—Penna. R.R., B. & O. R.R., D. T. & I. R.R.
Operating Mills in Southern Ohio

AMERICAN ELECTRICAL WORKS AMELECTRIC Wires and Cables PHILLIPSDALE, R.I.
Reg. U. S. Pat. Office

Incandescent Lamp Cord

AMELECTRIC PRODUCTS
BARE COPPER WIRE AND CABLE
TROLLEY WIRE
WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
MAGNET WIRE

AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.
Boston, 176 Federal; Chicago, 112 W. Adams;
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STANDARD
WIRES, CABLES AND CABLE ACCESSORIES
Manufactured by STANDARD UNDERGROUND CABLE CO.
Boston, New York, Philadelphia, Washington, Pittsburgh, Chicago, Detroit,
St. Louis, San Francisco

AETNA INSULATION LINE MATERIAL
Third Rail Insulators, Trolley Bases, Harps and Wheels, Bronze and Malleable Iron Frogs, Crossings, Section Insulators, Section Switches

Albert & J. M. Anderson Mfg. Co.
289-93 A Street Boston, Mass.
Established 1877
Branches—New York, 135 B'way
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Shaw Lightning Arresters
Standard in the Electric Industries for 35 years

Henry M. Shaw
150 Coit St., Irvington, Newark, N. J.

Lapp Insulators
Lapp Insulator Co. Inc. LeRoy, N.Y.
Trade Mark

ROEBLING
INSULATED WIRES AND CABLES
JOHN A. ROEBLING'S SONS CO., TRENTON, NEW JERSEY

GODWIN STEEL PAVING GUARDS
Adapted to all types of rails and paving.
W. S. GODWIN CO., Inc.

Proven by service to economically prevent seepage and disintegration of street railway paving.
Write for Illustrated Catalog No. 20.
Race & McComas Sts.,
Baltimore, Md.

BUDA
ESTABLISHED
1881

Special Track Equipment and Layouts of all kinds

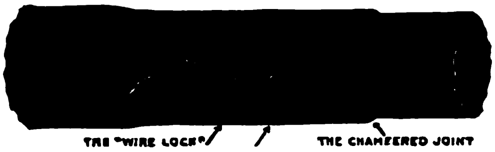
THE BUDA COMPANY
Harvey (Suburb Chicago) Illinois

BARBOUR-STOCKWELL CO.
205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of
Special Work for Street Railways
Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
Kerwin Portable Crossovers
Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

ELRECO TUBULAR POLES



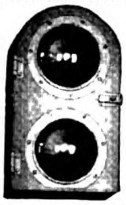
COMBINE

Lowest Cost **Lightest Weight**
Least Maintenance **Greatest Adaptability**

Catalog complete with engineering data sent on request

ELECTRIC RAILWAY EQUIPMENT CO.
CINCINNATI, OHIO
NewYork City, 30 Church Street

Chapman
Automatic Signals
Charles N. Wood Co., Boston



ANACONDA
TROLLEY WIRE
ANACONDA COPPER MINING COMPANY
Conway Building, Chicago, Ill.
THE AMERICAN BRASS COMPANY
General Offices: Waterbury, Conn.

American Rail Bonds

CROWN
UNITED STATES
TWIN TERMINAL
SOLDER
TRIPLEX

Arc Weld and Flame Weld

Send for new
Rail Bond Book

American Steel & Wire Company
CHICAGO
NEW YORK

DUNDEE "A" AND "B" FRICTION TAPES

DUNDEE A
FRICTION TAPE
THE OKONITE COMPANY
PASSAIC, N.J.
U.S.A.

Great Adhesive Strength
High Quality
Long Life
Price Right

DUNDEE B
FRICTION TAPE
THE OKONITE COMPANY
PASSAIC, N.J.
U.S.A.

Write for Samples and Circulars

THE OKONITE CO., Passaic, N. J.
Incorporated 1884
Sales Offices: New York—Atlanta—San Francisco
***Agents:* Central Electric Co., Chicago, Ill.; Pettingell-Andrews Co., Boston, Mass.; The F. D. Lawrence Electric Co., Cincinnati, Ohio; Novelty Electric Co., Philadelphia, Pa.**

OKONITE
TRADE MARK
REG. U.S. PAT. OFFICE

U. S. ELECTRIC AUTOMATIC SIGNAL
***for* single track block signal protection**
United States Electric Signal Co.
West Newton, Mass.

Peirce Forged Steel Pins
with Drawn Separable Thimbles
Your best insurance against insulator breakage
Hubbard & Company
PITTSBURGH, PA.

Lorain Special Trackwork
Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY
Johnstown, Pa.

Sales Offices:
Atlanta Chicago Cleveland New York
Philadelphia Pittsburgh
Pacific Coast Representative:
United States Steel Products Company
Los Angeles Portland San Francisco Seattle
Export Representative:
United States Steel Products Company, New York, N. Y.

High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
COMPLETE LAYOUTS
IMPROVED ANTI-KICK BIG-HEEL SWITCHES
HARD CENTER AND MANGANESE CONSTRUCTION

New York Switch & Crossing Co.
Hoboken, N. J.

SPECIALISTS
in the
Design and Manufacture
of
Standard—Insulated—and Compromise Rail Joints

The Rail Joint Company
61 Broadway, New York City

WHARTON
Special Trackwork
For Street and Steam Railways

Steel Castings **Gas Cylinders**
ORIGINATORS OF
Manganese Steel Trackwork

WM. WHARTON JR. & CO., Inc.
Easton, Pa.
Other Plants:
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.
Tioga Steel & Iron Co., Philadelphia, Pa.
Philadelphia Roll & Machine Co., Philadelphia, Pa.

Metal Safety Railway Tie Co.
522 North American Bldg., Philadelphia, Pa.
All-metal cross ties
Types for open and closed tracks
"More flexible than wood"
See advertisement, issue, Sept. 29, page 86.
Ask for circular on either type. *Prices upon application.*

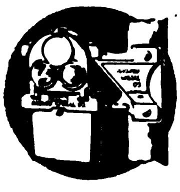
CRANES
Full Revolving
No Outriggers
Motor Truck Mounting

Send for Bulletin No. 22

The Universal Crane Co., 0000 Swetland Bldg., Cleveland, O.

AUTOMATIC SIGNALS
Highway Crossing Bells
Headway Recorders

NACHOD SIGNAL COMPANY, INC.
LOUISVILLE, KENTUCKY.



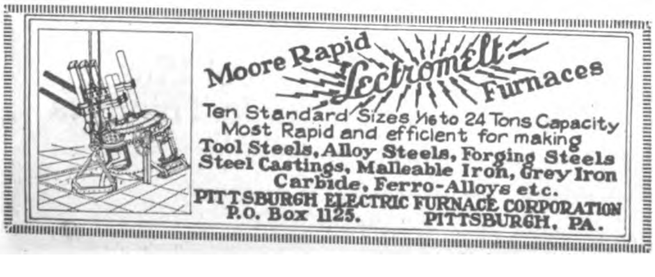
BUCKEYE JACKS
high-grade R. R. Track and Car Jacks
The Buckeye Jack Mfg. Co.
Alliance, Ohio

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we all differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

RAMAPO AJAX CORPORATION
Ramapo Automatic Return Switch Stands for Passing Sidings
RACOR TRADE MARK
RACOR Tee Rail Special Work.
Manganese Construction
GENERAL OFFICES: HILLBURN, NEW YORK
Chicago New York Superior, Wis. Niagara Falls, N. Y.
Canadian Ramapo Iron Works, Ltd., Niagara Falls, Ont.



Moore Rapid Lectromelt Furnaces
Ten Standard Sizes 1/16 to 24 Tons Capacity
Most Rapid and efficient for making
Tool Steels, Alloy Steels, Forging Steels
Steel Castings, Malleable Iron, Grey Iron
Carbide, Ferro-Alloys etc.
PITTSBURGH ELECTRIC FURNACE CORPORATION
P.O. Box 1125. PITTSBURGH, PA.

The Most Successful Men in the Electric Railway Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

193
IN
10224

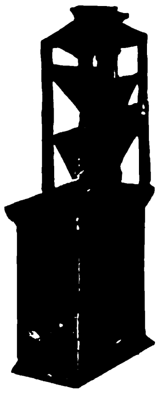
Type R-10

International Registers

Made in various types and sizes to meet the requirements of service on street and city system. Complete line of registers, counters and car fittings.

Exclusive selling agents for HEEREN ENAMEL BADGES.

The International Register Co.
15 South Throop Street, Chicago, Illinois



CLEVELAND FARE BOXES

always

Fit the Fare and Fare Collection System

The Cleveland Fare Box Co.
Cleveland, Ohio

Canadian Cleveland Fare Box Co., Ltd.
Preston, Ontario

Heywood-Wakefield

CAR SEATS

of pressed Steel for all Classes of Passenger Service. Rattan for covering seats and for snow sweepers.

HEYWOOD-WAKEFIELD CO.
Factory at Wakefield, Mass.
Offices at New York, Chicago, San Francisco

For detailed description — see — CAR BUILDERS CYCLOPEDIA 1922 Edition

SAMSON SPOT WATERPROOFED TROLLEY CORD

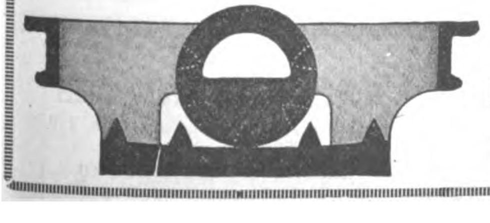
Trade Mark Reg. U. S. Pat. Off.
Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.

HALE-KILBURN CAR SEATS

For Every Class of Service

General Offices and Works: Philadelphia
Offices: New York, Chicago, St. Louis, Washington, San Francisco



STUCKI SIDE BEARINGS

A. STUCKI CO.
Oliver Bldg.
Pittsburgh, Pa.

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

Waterproofed Trolley Cord

SILVER LAKE A

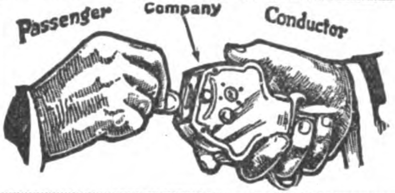
Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

FOR POSITIVE SATISFACTION ORDER SILVER LAKE

If you are not familiar with the quality you will be surprised at its ENDURANCE and ECONOMY.

Sold by Net Weights and Full Lengths

SILVER LAKE COMPANY
Manufacturers of bell, signal and other cords.
Newtonville, Massachusetts



Direct Automatic Registration By the Passengers

Rooke Automatic Register Co.
Providence, R. I.

THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED

No. 478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

"OSKELITE"

The Stop Light for street cars. Operates from brake system. Details on request

The Oskel Equipment Co.
940 McCormick Bldg., Chicago, Ill.

PS HEATERS

Car Heating and Ventilation

are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

The Peter Smith Heater Company
6209 Hamilton Ave., Detroit, Mich.

SEARCHLIGHT SECTION

USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 to 3 inches	$4.50 an inch
4 to 7 inches	4.30 an inch
8 to 14 inches	4.10 an inch

Rates for larger spaces, or yearly rates, on request.

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

E.R.J.

POSITIONS VACANT

DRAFTSMEN-COMPUTERS wanted on railway trackwork working knowledge of and facility in trigonometry essential. State in letter, age, education, experience and approximate salary. Employment Dept., Bethlehem Steel Co., Steelton, Pa.

SHOP foreman wanted for interurban car shop handling eight or ten cars, doing cleaning, inspection and light repairs; excellent opportunity for right man. State experience and salary expected. P-628, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

POSITIONS WANTED

CAN you make an opening in your sales or purchasing force for a man with broad engineering and executive training with the largest steam and electric car builders? Feel that I can deliver maximum amount of common sense and business ability. Preferably Chicago district. PW-632, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT of transportation and equipment, with eighteen years' experience, open for position of superintendent or manager, Jan. 1. PW-629, Electric Railway Journal, Real Estate Trust Bldg., Phila., Pa.

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Receiver's Sale of Property and Franchises of Northern Massachusetts Street Railway Co.

Notice is hereby given that D. P. Abercrombie Receiver of Northern Massachusetts Street Railway Company pursuant to decree of the Supreme Judicial Court of Massachusetts, sitting in Suffolk Country, entered November 9, 1923, in the case of William Gilmour v. Northern Mass. Street Railway Company No. 35532 Equity, *will receive sealed bids* for the purchase of all the property and franchises of the Northern Massachusetts Street Railway Company, at the office of the Receiver, Greenfield, Massachusetts, *up to ten o'clock A. M. on December* 27, 1923, at which time said bids will be opened.

The property is to be sold in parcels which are fully described in circular on file at the office of the Receiver in Greenfield. Copies of this circular may be had upon application.

D. P. ABERCROMBIE, Receiver, P. O. Box 614, Greenfield, Mass.

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  - St. Louis Car Co.
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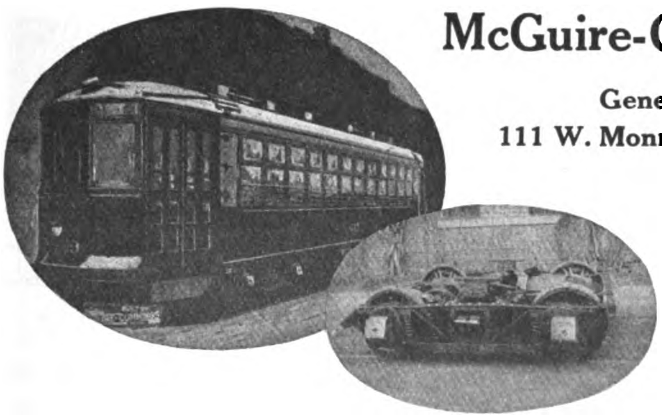

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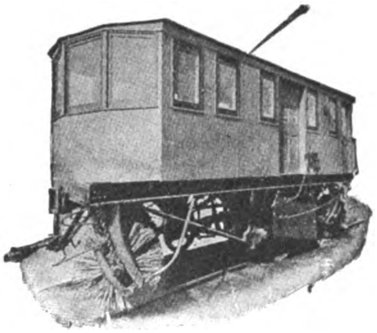

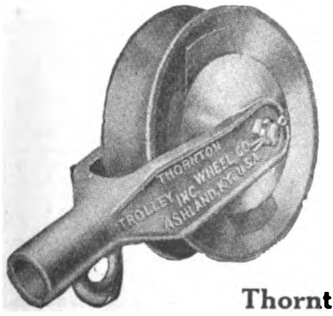

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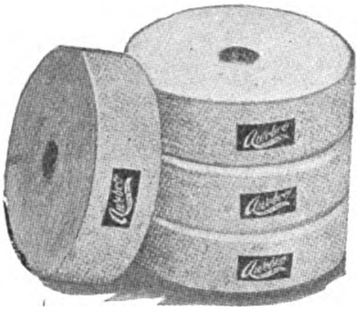

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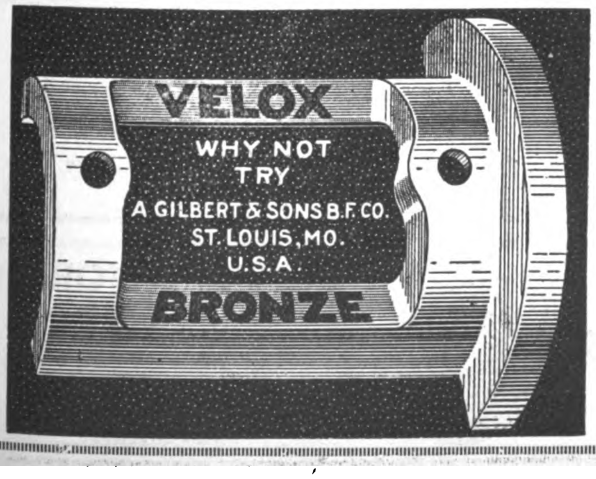

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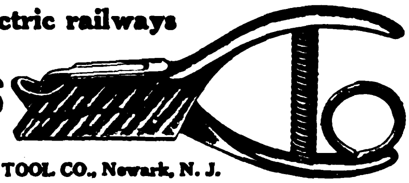

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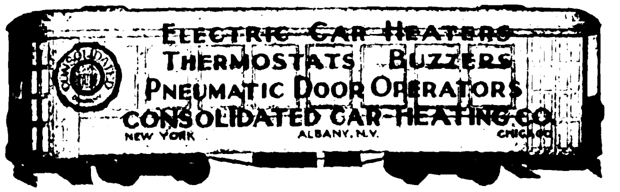

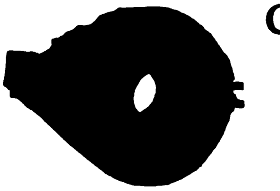

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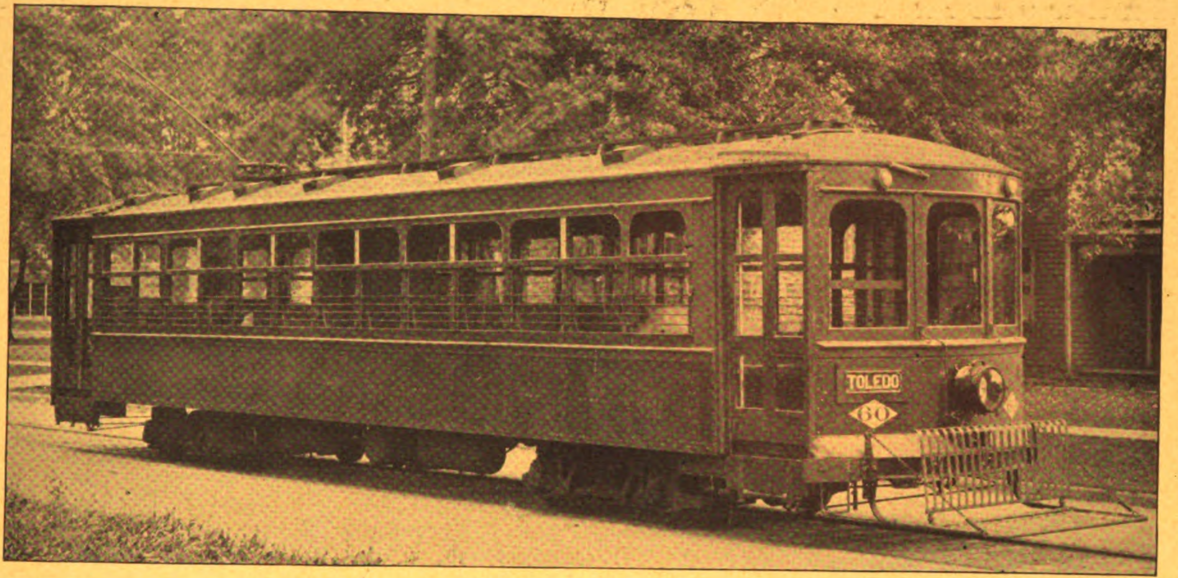

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This type of light-weight interurban car for single-end operation built by the G. C. Kuhlman Car Company has been adopted by the Northwestern Ohio Ry. & Pwr. Company, operating between Toledo and Bay Point, Ohio, a 55-mile run.

Fully equipped ready for operation, this type car weighs but 34,500 lb. while the type car displaced weighed 66,000 lb., assuring an appreciable saving to the company in operating costs. These cars are mounted on Brill 77-E-1 trucks with 26-in. diameter wheels constructed with special swing links for higher speed service. Thirty-five horsepower motors are included in the equipment and the schedule speed under which the cars are operated is 21.6 miles per hour.

The car body is 47 ft. 4 in. long over bumpers, 8 ft. 6 in. wide over posts and has seating accommodations for 56 passengers. It is so partitioned that the front part of the car is the main passenger compartment, giving a most pleasant and unobstructed view to the front and sides. The rear part of the car is set aside as a smoking compartment while the rear platform is used for baggage.

At terminal points passengers enter by way of the rear platform and unload at the front, while at other points on the line passengers both enter and leave by way of the front platform.

Complete details of construction will be furnished upon request to—

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO. — G.C. KUHLMAN CAR CO. — WASON MANF'G CO.
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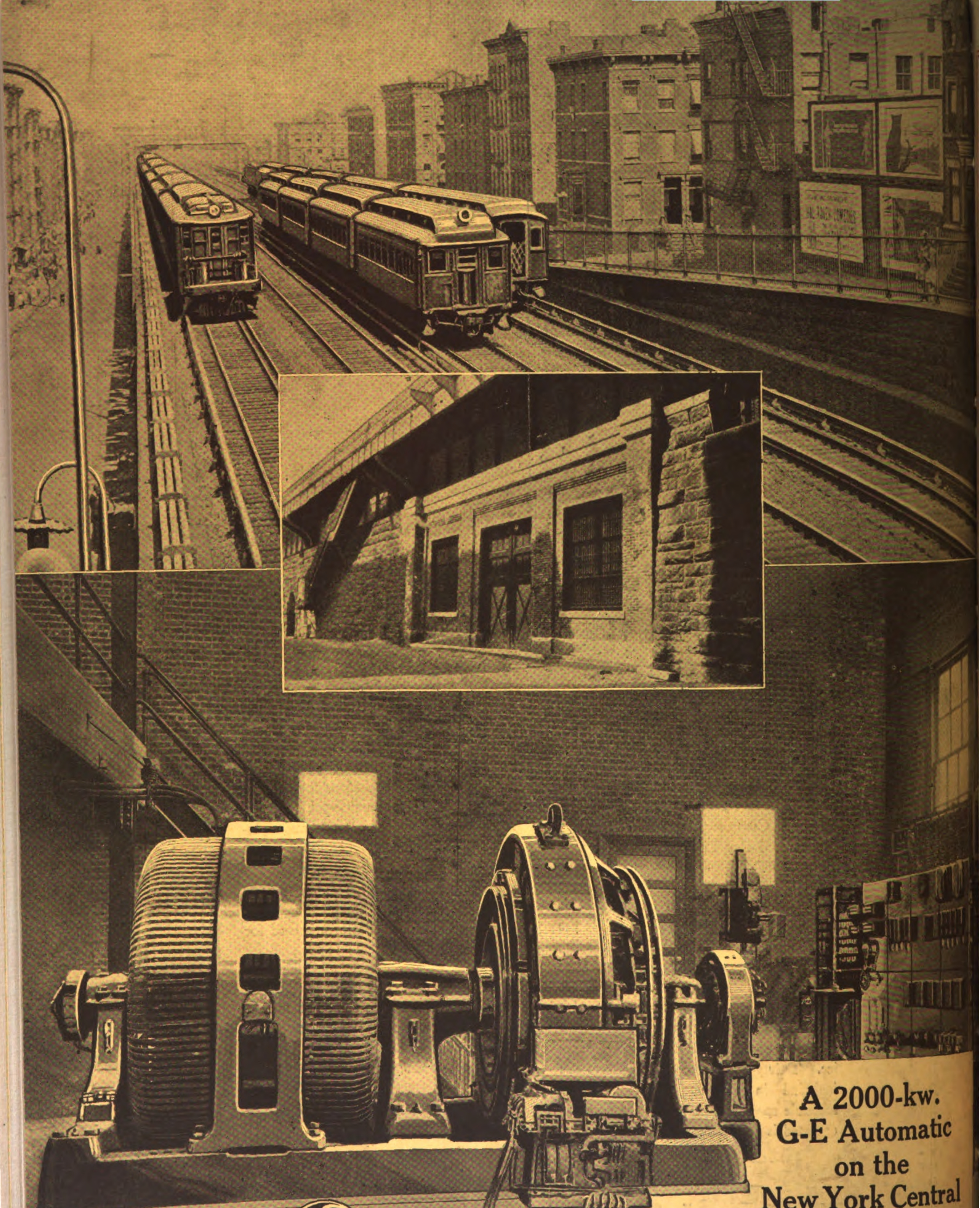

A 2000-kw. G-E Automatic on the New York Central

Here is a case where automatic switching permitted the use of a machine much smaller than the load demand. The minimum space and lowest operating expense were the controlling factors.

General Electric Company
Schenectady, N. Y.

GENERAL ELECTRIC

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McGraw-Hill Co., Inc. December 29, 1923 Twenty Cents Per Copy

ELECTRIC RAILWAY JOURNAL

A New Year's Announcement

STEEL TWIN TIE TRACK

is renewable

IN the thirteen years since the first installation of Steel Twin Ties was made the outstanding merits of this type of construction have been classified not only by our efforts but by the comments in the technical press of engineers who have installed Twin Tie Track.

That the reasons urged for the use of Twin Ties up to this time have been ample is evidenced by the rapid and consistent adoption of Twin Tie Track. Economical, permanent, adaptable and easy riding track when proved by cost records, years of service, special conditions and by actually riding on it, recommends itself as good construction.

But now, nearly two years after the first test renewal installation was made, it can be positively stated that such track is renewable — that definite details taking into account all engineering requirements have been worked out providing for complete renewal without removing anything but the rail and the paving down to the base of rail.— Further that the cost of renewal is in the neighborhood of Two Dollars and Fifty Cents a track foot exclusive of new rail, joints, new paving and paving labor.

That such a base is renewable brings forward many interesting if somewhat obvious points. To mention a few — this method of renewal would justify charging the permanent steel tie base to capital account and renewal cost to operating, or— over a period of years it will greatly reduce the car mile charge for maintenance of way. Again, it could be urged that municipalities should carry paving costs where such a permanent base were installed.

In this limited space and as this is merely an announcement, no details are covered here. The complete method is described in a circular now on the press— "How the Second Rail Goes In on a Steel Tie Foundation" which will be mailed to you if your name is on our mailing list, if not please ask for it.

THE INTERNATIONAL STEEL TIE COMPANY
CLEVELAND, OHIO

"All Aboard for PROSPERITY"
1923
1924
W
WESTINGHOUSE ELECTRIC

Welcome 1924!

The Electric Railway Industry can look forward with confidence to prosperity during the coming year.

The extended use of efficient cars and equipment; the expansion of freight haulage service; the use of multiple unit trains for mass transportation; the auto bus where suited; and the continued development of public confidence, mean continued prosperity.

The Westinghouse Electric organization stands ready, as in the past, to assist the industry in solving its 1924 problem.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.

Westinghouse

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Vol. 62, *No.* 26 New York, December 29, 1923 *Pages* 1075-1108

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Editorials 1075

Demountable Containers Expedite Freight Handling in Michigan 1077
BY E. J. BURDICK.
A special truck chassis with demountable container has been adopted by the Detroit United Railway to pick up and deliver less-than-carload freight shipments with maximum economy.

Trainmen and Community Work for Safety 1080

Traffic Problems in a City of 70,000................. ..1081
John A. Beeler shows in his Charleston report how a non-paying road in a city of this size, even when operating one-man cars almost exclusively, can still reduce operating expenses considerably.

Capitalizing on the Coffin Prize 1087
How the Chicago, North Shore & Milwaukee Railroad is turning the winning of this award to good account. Its value a[illegible] a publicity asset is being fully utilized in newspaper advertising, window displays and company publications.

How Economy in Current Was Obtained in El Paso....1088

Simplicity of Arrangement Features New P-O Cars...1089
BY RICHARD N. GRAHAM.
All pipes, wires, switches, engines, etc., are inclosed in cabinets. Advertising cards and luggage racks have been eliminated in order to improve the interior appearance. Woodwork is of mahogany.

Keeping the Cars on Schedule.........................1091
Organization and operation of dispatching system of Kansas City Railways is briefly told. Effective check of car operation in the field has served to produce a high standard of service. Company police department a great aid.

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The Volume Index

HAS ALWAYS BEEN a feature of the ELECTRIC RAILWAY JOURNAL. A great deal of care is put on its compilation and a special effort is made by the publishers so that the index will be included in the last number of the volume.

The index of the ELECTRIC RAILWAY JOURNAL has always been much more than an index of titles or even of articles. Where an article treats of a variety of topics, a corresponding number of entries appear in the index, together with supplementary entries under the name of an operating company, if the article relates to or describes the practice of any railway property.

The list of principal key words appearing immediately after the title page was long a unique feature of the ELECTRIC RAILWAY JOURNAL index, though recently some other papers have adopted the same idea. It is designed to aid those who may be uncertain of the exact term under which a certain article is entered. This list of principal key words naturally changes somewhat from year to year with the changes in nomenclature and practice of the industry.

The publisher of the JOURNAL believes the index will be useful to every subscriber, whether he binds his back copies or not. For this reason it does not follow the practice of some papers of requiring subscribers who want a copy of the index to write for one. It binds the index with each copy of the last issue of the volume.

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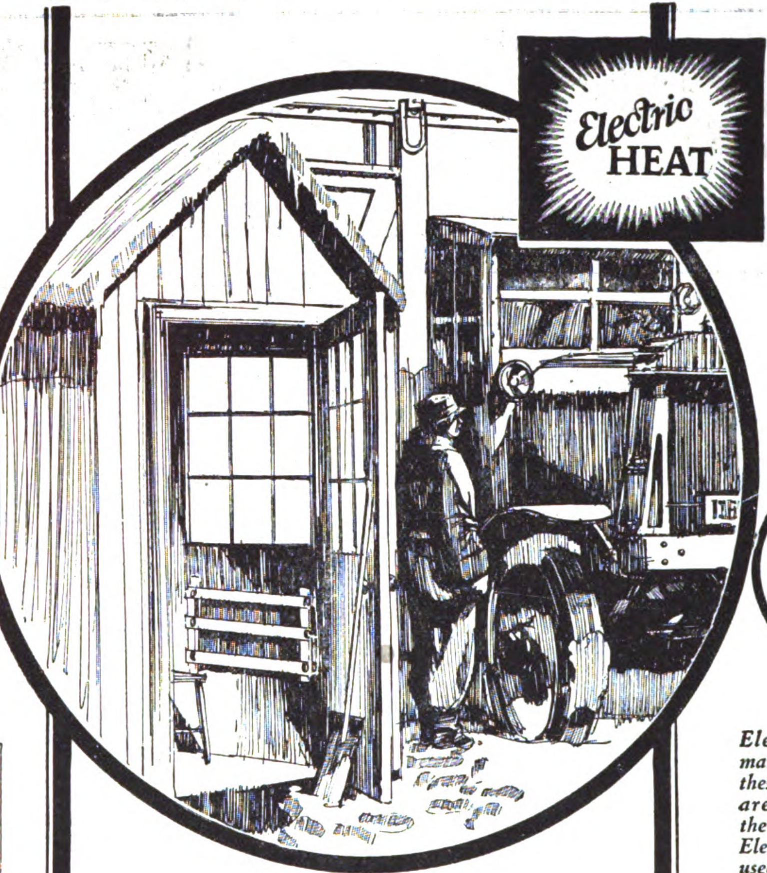
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Your watchman is human, and like others, he cannot work efficiently when cold. Two or three space heaters in the sentry house will keep him warm in the coldest weather, at a surprisingly low cost, and without danger of fire.

The duties of a crane man require that he be ready to promptly respond to exacting responsibility at any time. If his crane cab is chilly, if his fingers are stiff, he will not be able to properly control his crane. Westinghouse space heaters will increase the efficiency of your crane man by keeping him warm.

Order a box of these convenient heaters today, and have your electrician install them in some of those hard-to-heat places around the plant. Then you won't have to worry about the heating problem.

Get in touch with the nearest Westinghouse sales office today. The office representative will gladly give you data on the various sizes.

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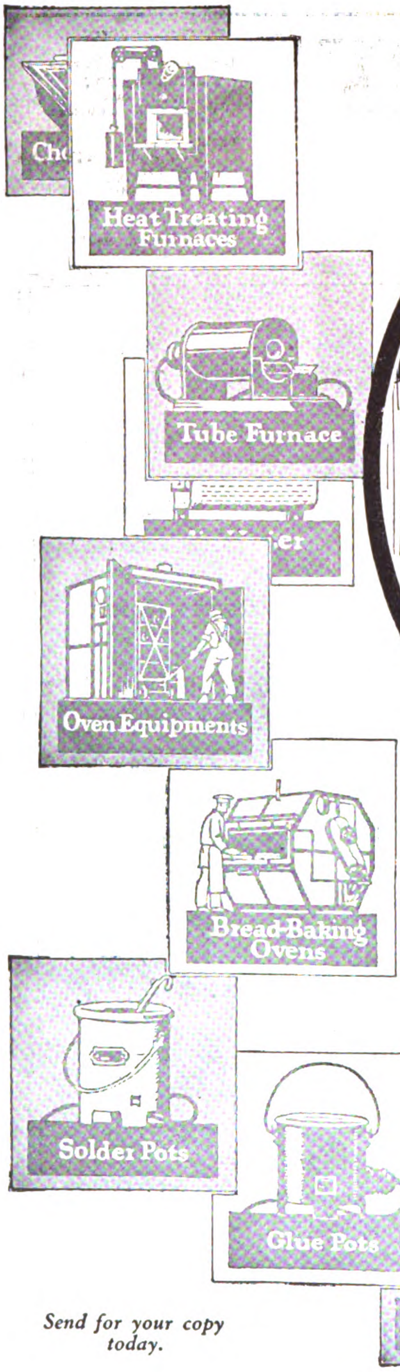
Electric heat has many uses. A few of these applications are suggested by the small sketches. Electric heat can be used in your business.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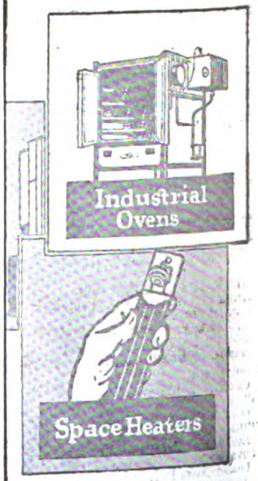
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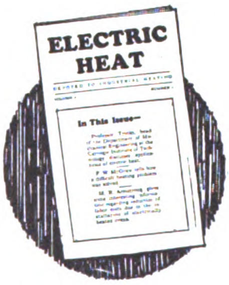
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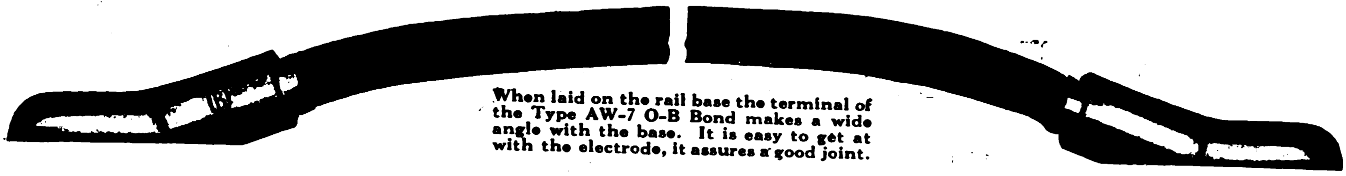
Westinghouse



When laid on the rail base the terminal of the Type AW-7 O-B Bond makes a wide angle with the base. It is easy to get at with the electrode, it assures a good joint.

Welding Steel to Steel with Steel

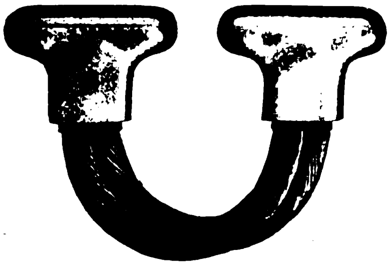
Welding steel to steel with steel is the easiest method of welding. It will result in a better average of thorough work.

The average welding operator is surer in his work with all steel—the chance of incomplete fusion—of one poorly bonded joint offsetting the value of other good ones—is less.

Welding steel to steel with steel will prove itself out on the job where welding conditions vary—where results must be in the highest average of good joints.

O-B Type AW Arc Weld Bonds are steel terminal bonds. The cable strands are welded into the steel terminals. They offer excellent inducement to 100% bonding, because the terminals are shaped for easy welding—because they provide for on-the-job welding of steel to steel with steel.

The cable strands are welded into the terminals of O-B AW Bonds.



The AW-8 Bond, like the AW-7 shown at top of the page, has steel terminals shaped for easy welding. This ball-of-rail bond can be installed without disturbing paving or any built-up roadway.

O-B Bonds provide a better circuit because they make good welding easy.

Publication 502 has interesting facts on Bonding—Write for copy

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The time to do your rail grinding is all the time. There's always some spot that shows corrugations or wear, some joints that need building up, welding and grinding.

Don't wait until you simply have to do it. Look for chances to use your rail welders and grinders. That's the secret of economical track maintenance. Only smooth track satisfies the public, saves the rolling stock, makes speed safe and prolongs the life of the whole track structure. Plenty of grinders and plenty of grinding are true economy.

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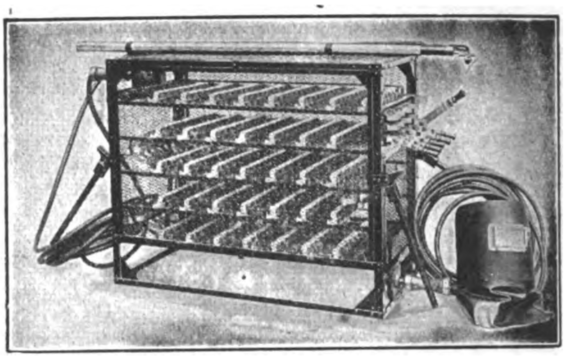
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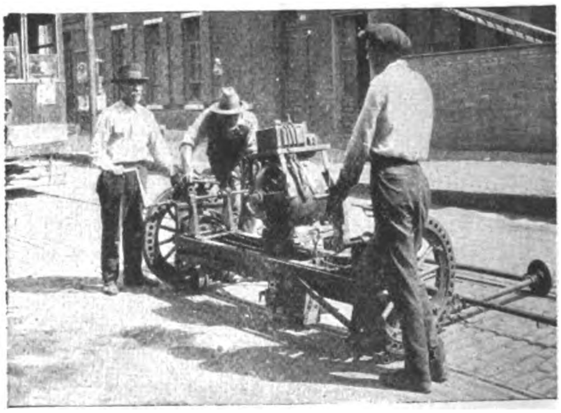
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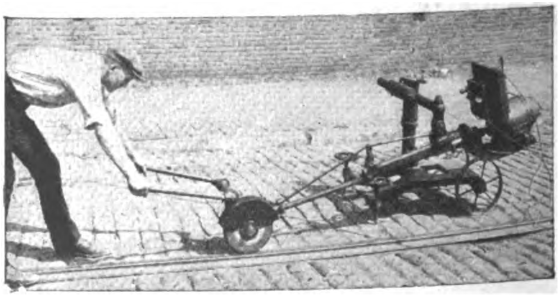
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KEYSTONE

Equipment for Employees

Uniform Caps	**Uniform Buttons**
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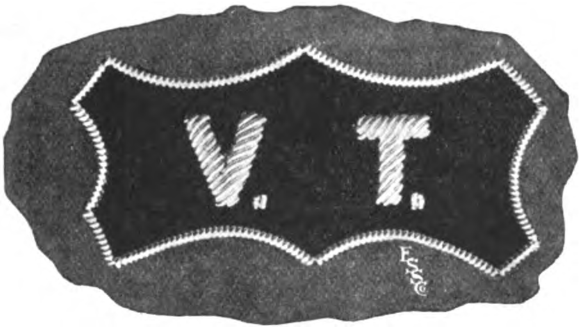

Neatly embroidered, dignified-looking uniform insignia is a self-respect builder for any group of employees. This idea is being adopted by many of the leading steam and electric railways. Furnished in various styles in gold, silver or gilt. Sewed directly to the uniform.

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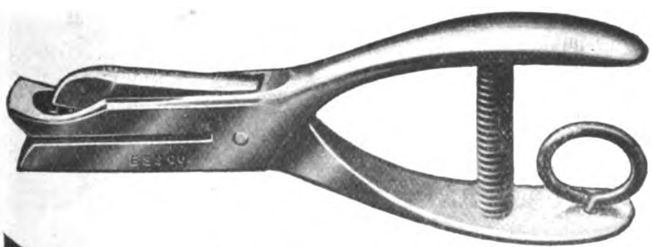
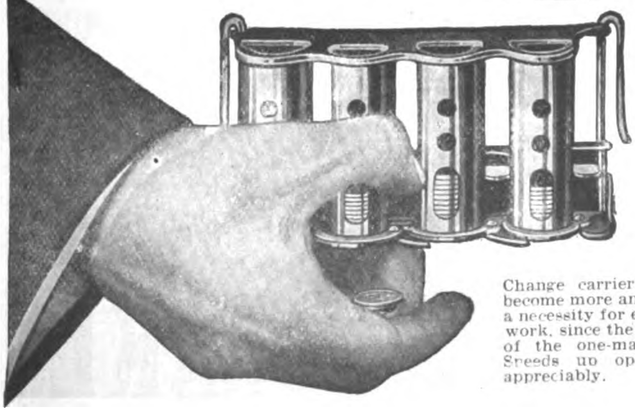
Enameled badges for employees' caps and coats furnished in a wide variety of styles. Well-made and neat, with lettering of utmost legibility.



High-grade punches, with widest choice of die shapes where distinctive characters are desired. The well-known "Utility" type punch and also the "Standard" line.



Change carriers have become more and more a necessity for efficient work, since the advent of the one-man car. Speeds up operation appreciably.

See Catalog No. 7

for full details and numerous illustrations of employee equipment. Shown in various styles and types which will help you in choosing the right equipment for your requirements.

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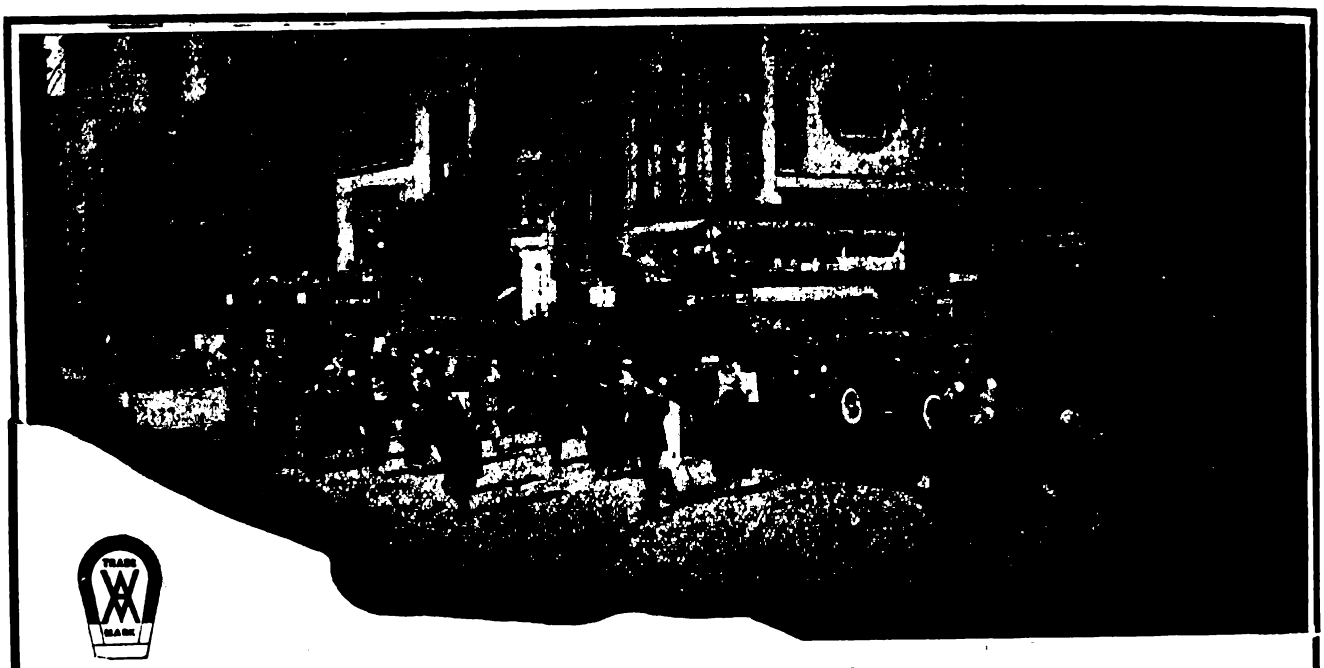

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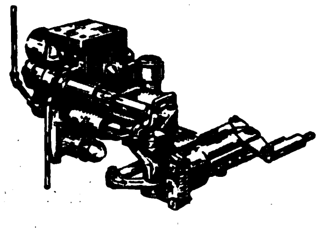


THE VARIABLE LOAD BRAKE

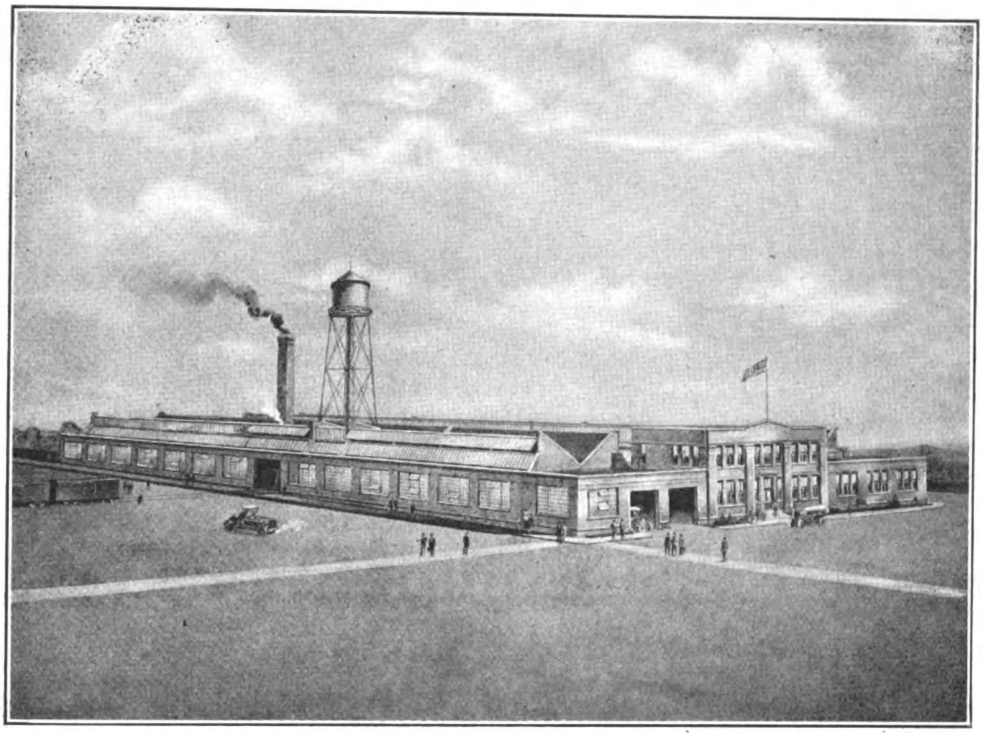
The Westinghouse Variable Load Brake has been developed to solve the problem of controlling cars under widely varying load conditions. It is an attachment which may be added to any straight air or semi-automatic equipment whereby the braking force is automatically adjusted to suit the weight on the car, by regulating the brake cylinder pressure as the weight changes.

The adjusting mechanism is thrown into engagement by the opening of the car doors. While the doors are open, passengers are leaving and entering the car, and when the doors are closed again, the condition of loading will be that under which brake operation will take place for the next stop, or a slow-down, as the occasion may demand.

The use of the Brake insures stopping within a uniform distance regardless of whether the car is empty or loaded.

WESTINGHOUSE TRACTION BRAKES

SUPREMACY



Because—

every possible thought, care and attention is given to *safety, service* and *satisfaction* in the design and manufacture of—

NATIONAL PNEUMATIC EQUIPMENT

Door and Step Operating Mechanisms
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Motorman's Light Signals
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Designed by engineers and experts who are in constant closest touch with every development and every progressive step in the passenger transportation industry.

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Followed up in installation, operation and maintenance by our Service Department, to insure satisfactory results.

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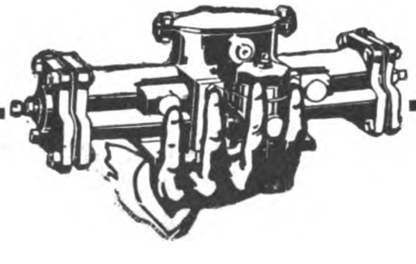

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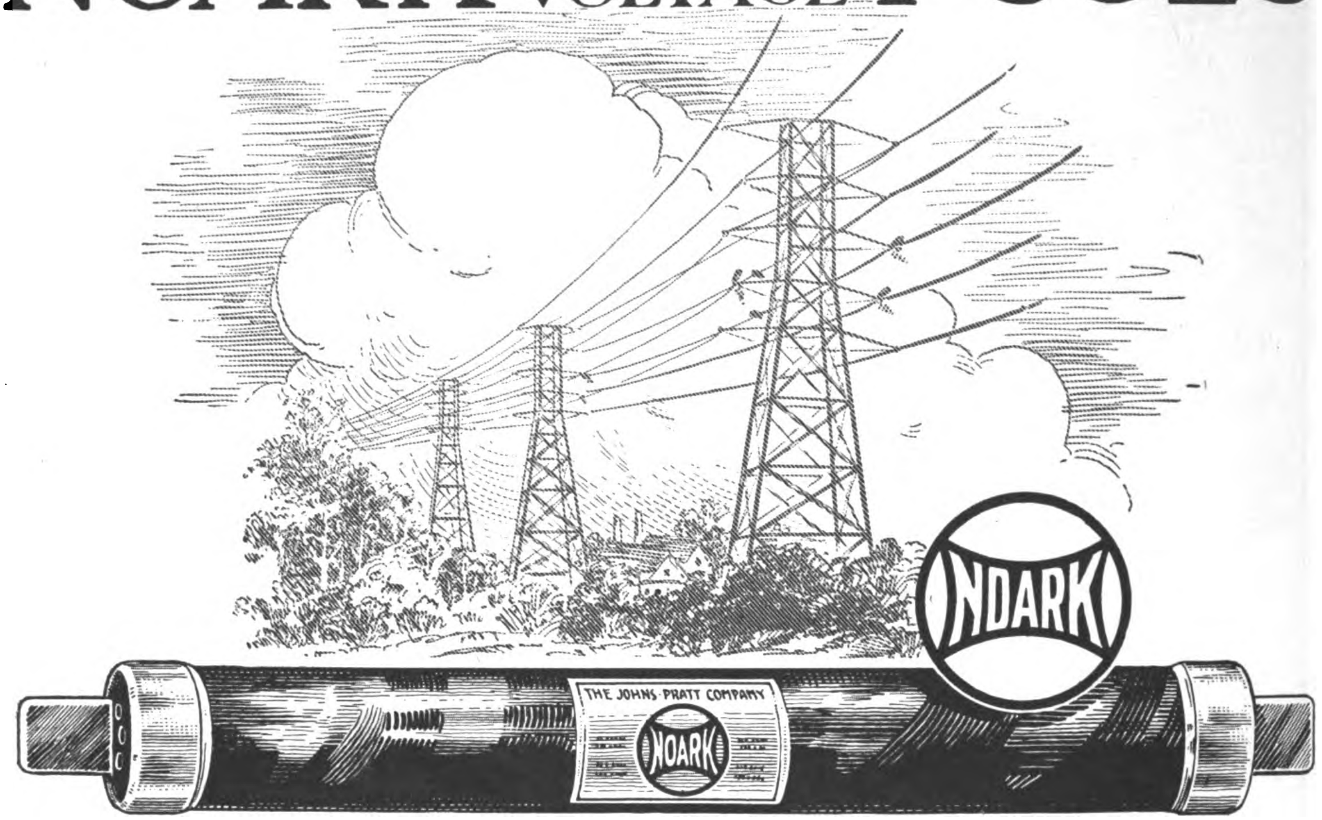

From ½ ampere at 2500 volts to 5 amperes at 22000 volts

A complete line of high tension primary fuse protective devices for transformers and branch circuits, etc. Covers standard ampere and voltage requirements at 2500 volts, 4400 volts, 6600 volts, 13200 volts, 22000 volts and all intermediate voltages.

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Economy Meters are inducing savings from ⅕ to ⅓ a cent per car mile. It will pay you to investigate whether you are operating one car or three thousand.

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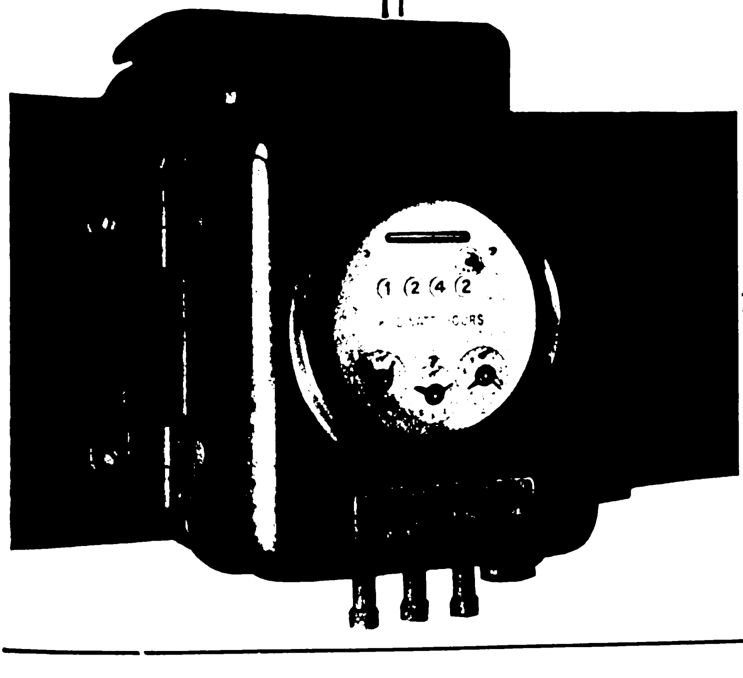

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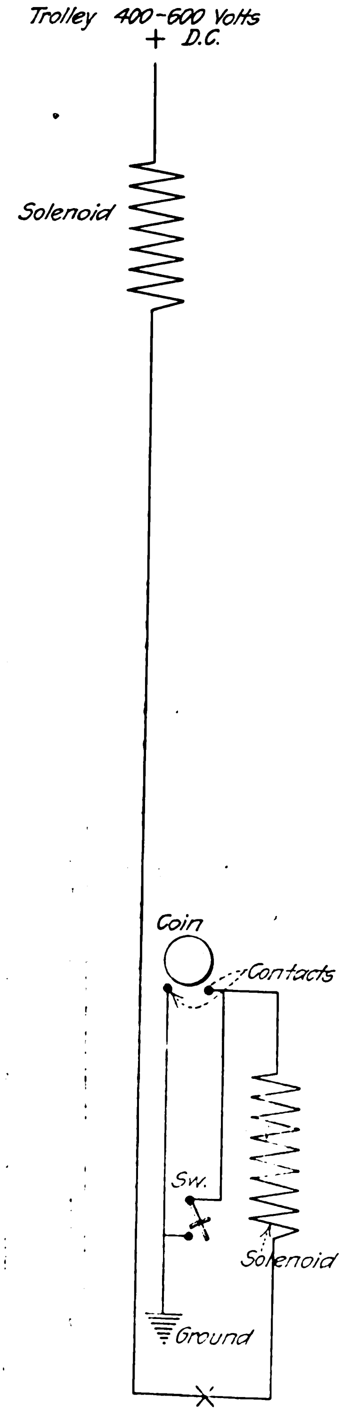

Instantaneous Registration!!

OVERHEAD

Our new system adapted to fare collection where the basic fare is either 5 or 10 cents.

Passenger depositing ***fare*** in slot ***instantaneously registers*** on overhead fare payment—the coin ***automatically*** does this electrically.

Conductor makes observation at slot or at inspection plate ***of coin deposited.***

Company earnings shown on ***overhead*** register.

Inspection both ***visible*** and ***audible*** are part of this system occurring immediately with coin depositation.

COIN

The units are connected in series tapped into the trolley circuit; positive mechanism and electrical insulation assures the correct registration and safety of these devices—the conductor's work is reduced to a minimum—he has access to the coin after registration for change making and car accounting is made at the source.

We Offer You Trial Installation

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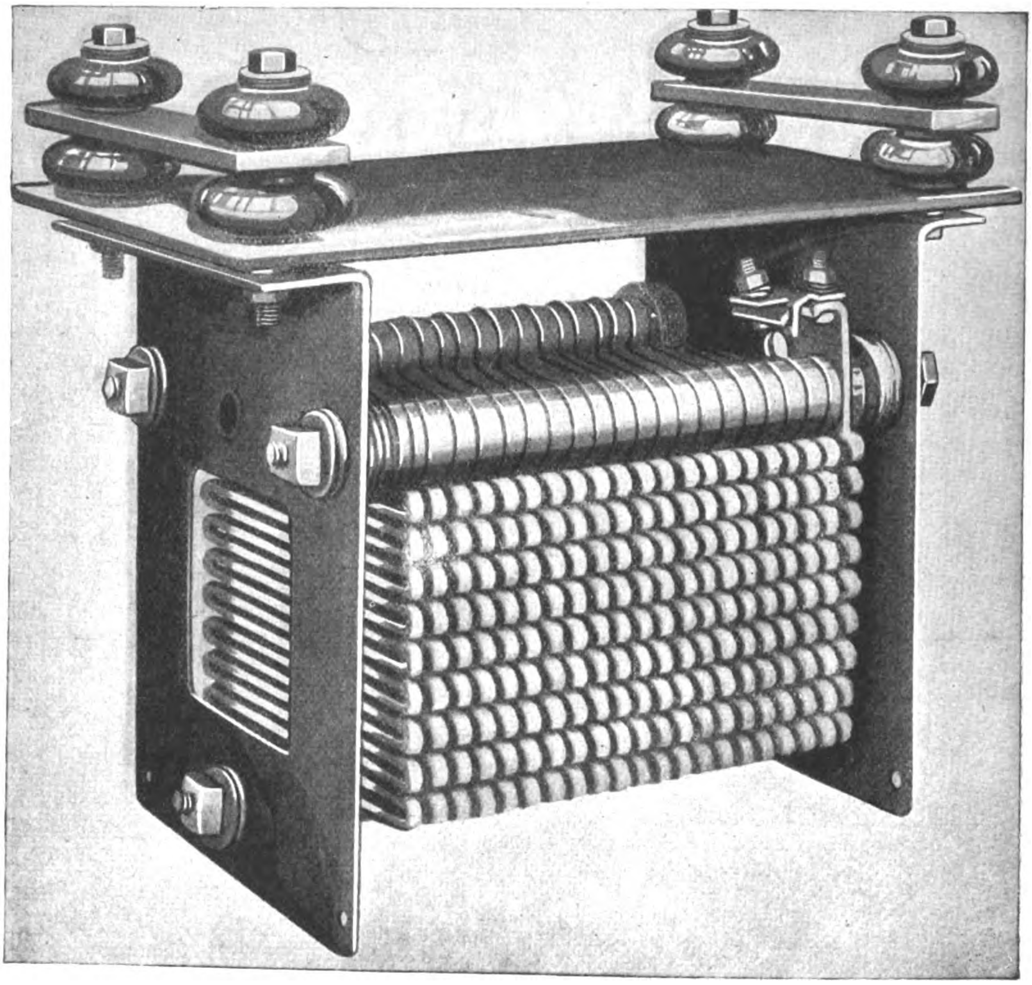

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Volume 62

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Instructions for Use of Index

This index is essentially a subject index, not an index of titles, and articles treating a number of different subjects are indexed under each of them. In addition, a geographical reference is published wherever the article relates to any particular railway company, or to the state matters of any particular state. The geographical method of grouping serves to locate in the index any article descriptive of practices, conditions, events, etc., when the searcher knows the electric railway, city or state to which the article applies. Groupings are made under the name of the city in which the main office of the company is located, but an exception is made in the case of electrified sections of steam railroads, such entries being made direct under the name of the railroad. City or state affairs appear under the names of the city or state involved.

In the subject index, the alphabetical method is followed, and if there is a choice of two or three keywords the one most generally used has been selected, cross references being supplied. Below will be found a list of the common keywords used in the index to this volume. This list has been subdivided for convenience into thirteen general subjects, but the general subject headings, shown in capital letters, do not appear in the body of the index unless, like "employees," they appear also in small type. As an example of how to use the index, if a reader wishes to locate an article on special trackwork he would obviously look in the list under the general subject Track and under this caption, only Special trackwork could apply to the article in question. The reader would therefore refer to this keyword under S in the body of the index.

In addition to the groups of articles covered by these headings the papers and reports from railway associations are grouped under the names of the various organizations. Proceedings of other associations and societies are indexed in general only in accordance with the subject discussed. Short descriptions of machine tools appear only under the heading "Repair shop equipment" and are not indexed alphabetically, because of the fact that there is a wide choice in most cases of the proper keyword to be used.

CLASSIFIED LIST OF KEYWORDS

ACCIDENTS AND ACCIDENT PREVENTION

Accident claim department
Accidents (including wrecks)
Safety work
Storm and fire damage

CARS AND OTHER VEHICLES

Automobiles
Cars (including car design)
Locomotives
Motor buses
Motor trucks, gasoline
Service and tower trucks
Trackless trolley
Work and wrecking cars

CAR EQUIPMENT

Bearings
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Current collection
Electrical equipment
Fixtures
Gears and pinions
Motors
Trucks
Wheels and axles

EMPLOYEES

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Labor
Strikes and arbitrations
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Wages and working agreements

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Fares
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Traffic stimulation

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Accounting
Appraisal of railway property
Financial
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Insurance
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Legislation for railways
Market conditions
Operating records and costs
Public service and regulative commissions
Statistics
Taxes

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Heavy electric traction (general)
Locomotives

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STRUCTURES

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Another Car Designed to Sell Transportation

IN SOME ways the design of the new light-weight interurban cars of the Pennsylvania-Ohio Electric Company, described elsewhere in this issue, goes further than previous designs have done with the idea of making the ride comfortable and pleasant for the passenger. Deep-cushioned seats, linoleum-covered floors and real mahogany woodwork have become fairly familiar during the past year or two, and it is generally accepted as good practice to keep bell cords, register rods, door engines and the like out of sight. But this railway has gone beyond that by concealing the air pipes to the engineer's valve behind a metallic cover painted to harmonize with the interior car trimming, and by eliminating altogether the advertising signs and luggage racks.

While elimination of advertising presumably does raise the dignity of the interior, the need to do so in a coach is debatable. Nowadays the car cards are for the most part tastefully designed, printed on good quality material, and neatly installed. They are usually inoffensive to the eye and they often furnish the passenger food for thought in idle moments.

The concealment of the air pipes, however, will be considered by everybody to be a good move. These are unsightly at best, and frequently oily and dirty.

The special lighting fixtures and the mahogany trim in the upper part of the Pennsylvania-Ohio cars add unmistakably to the distinctiveness of their interiors. While the lines of these cars are not as good as might be secured, the attractiveness sought has been obtained in substantial measure.

Such innovations as are made in this and other recent cars show that the industry is giving some well-deserved attention to the subject of car design from the merchandising as well as the engineering standpoint. The roads that have adopted these new ideas have invariably found that their business profited and their public relations were improved.

Where the Dangers to One-Man Cars Lie

NEWS reports of the last three months indicate a revival of the opposition to one-man cars. These attacks are not confined to any one part of the country. There have been rumblings of dissatisfaction in the East, South, Central States and Far West, and it may be that this condition will be reflected in hostile legislation during some of the 1924 sessions. It is to be hoped that these cases of dissatisfaction are purely sporadic. Nevertheless, the one-man car has been such a boon to the industry that it behooves every railway man to consider what may be done to overcome any sentiment of this kind which may limit the operation of cars of that type on his road.

There are only three possible reasons for opposition to one-man car operation, namely:

1. A belief that the interests of labor require a larger crew on street cars than is actually necessary.
2. Ignorance on the part of the public of the merits of the one-man car.
3. An attempt by companies to make the one-man car do more than it should be called on to do.

The first reason will probably always prevail to some extent, so long as demagogues exist. Nevertheless, it is not a difficult task to prove that the interests of labor lie in just the opposite course. Not only do one-man operators receive a higher wage than operators on two-man cars, but if the service should be confined to two-man cars, many electric railway companies would have to go out of existence. So-called "full crew" laws were for long a needless expense to the steam railroads, but the public generally has come to understand that they cause an economic waste.

Ignorance on the part of the public of the merits of one-man cars, the second reason mentioned above, may be expected in cities where they have not been in service. It can be overcome only by carefully considered explanation and education before the cars are put in operation and during the early stages of their trial.

Perhaps the greatest danger to the one-man car comes from the third cause mentioned, i.e., from the companies themselves. The merits of the one-man car should not blind any one to the fact that it has its limitations, and its greatest real friends are those who are willing to recognize that it has these limitations.

The One-Man Car Has Its Limitations

IF THERE is an attempt to make the one-man car do more business than it comfortably can, either as regards its loading capacity or the ability of the operator to make change, this condition is immediately reflected in longer stops and slower schedule speed, and if this condition continues the result is not only an exasperated public, but lower earnings per car-hour. In some instances this critical point has undoubtedly been passed, usually through overenthusiasm as to what one-man cars can do. And it is perhaps significant that such cases of overenthusiasm are most apt to be found on properties where the one-man car is comparatively a recent innovation. This is only to be expected, because history has frequently shown that recent converts to an idea are apt to be not only the greatest zealots in its behalf but that they often err in going too far in its application.

Fortunately, there are many ways of overcoming difficulties of passenger congestion on one-man cars, without abandoning the one-man idea.

The simplest way of helping out the operator when his duties are so many as to slow down the speed of the car is to simplify his task of collecting fares. Usually, there are many possible ways of doing this. Sometimes street collectors can be used to advantage at congested points at certain hours. Occasionally the conditions are such that prepayment areas can be introduced. The time of change making on the car can be made less by the use of tokens and passes, and it can be distributed over a long time and so shorten the length of stops by operating the car pay-leave in one direction and pay-enter in the other. Or the problem may be approached with the idea of shortening the time of other parts of the process of fare collection or in some other way to reduce the work of the car operator.

A good gage for determining whether some time-saving is desirable is the figure attained of schedule speed in miles per hour. Where this begins to get below that of other cities of like population and similar street congestion, or shows a retrogression on the same property, something should be done. If the simple methods described herein and others like them fail, the two-man car may be the only recourse.

Great help along the lines being considered may be expected of the one-man two-man car, provided it really is operated by one man when the traffic conditions call for such operation, and by two men when two-man operation really is demanded, which will usually be during the rush hours. From a tabulation of recent car orders, this seems the most popular type for city railways today. It is an ideal design when used with judgment.

Obviously, such a car in one-man two-man service means considerable extra work for the schedule maker in connection with the conductor's runs, because on many lines there will be few if any straight runs for conductors left. But the task of providing satisfactory runs for the majority of the men is not insurmountable.

Economies Possible on Small Properties Too

IN THIS issue is reviewed at some length the report of a consultant on the railway in Charleston, S. C., which serves a population of 70,000. It is of interest because there are many small properties whose earnings are not very good and with which it is often thought nothing much can be done. Yet in Charleston it was found that material savings could be made, in spite of the fact that about 90 per cent of the city service was already being supplied with one-man cars.

The principal savings are expected to be realized from the elimination of duplicate and waste car mileage and from a speeding up of the cars. The greatest ailment from which the small properties are suffering is a slow, indifferent sort of service. Charleston was not as bad in this respect as many, in spite of its Southern clime. But the system was suffering from an excessive number of stops and several other practices that tended to slow up the operation and not only make costs high but discourage riding. Then there were a number of things, small in themselves but totaling big, that the outside point of view found could be done to cut costs. So there are things to be done, even with the small property. And while cutting expenses, some of the major economy measures also improve the service, and more patronage is thereby attracted.

Make Signs Informative for the Casual Reader

MUCH emphasis is being placed these days on the idea of merchandising transportation. An important part of merchandising is so to describe the goods that the public will know what is being offered and will want to buy. For the regular rider, a single letter or number designation on a car is all that is needed and is a very good plan. But the destination sign should be so worded as to give the stranger and casual rider the maximum possible information.

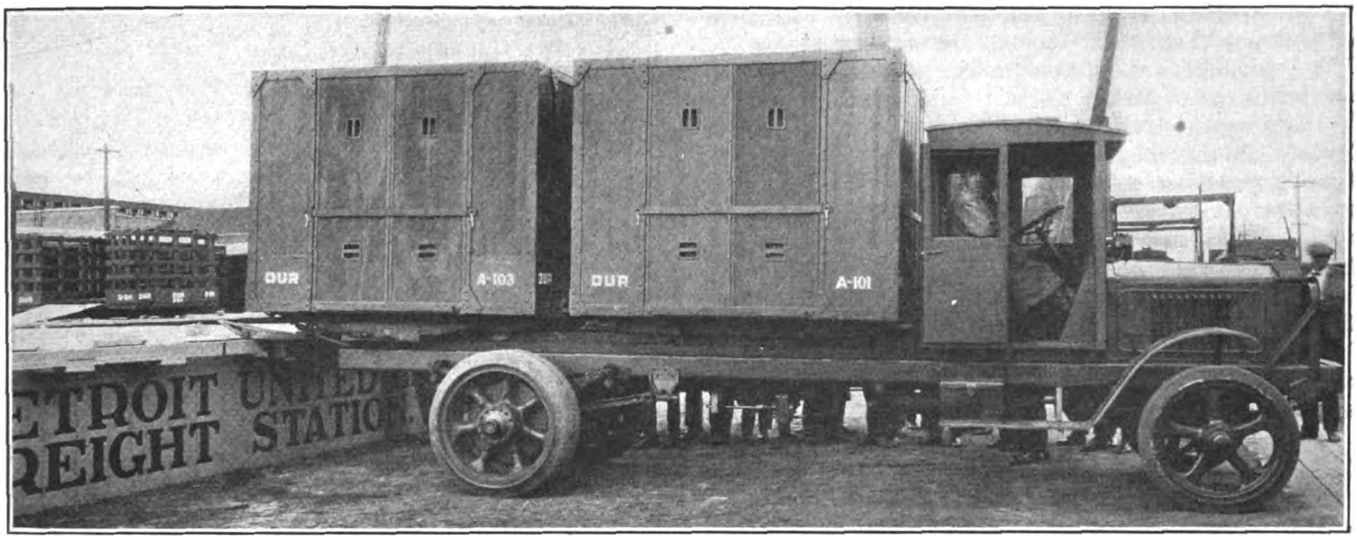
Perhaps this idea was more fully realized by the street railway men of thirty years ago than it is today, for in those days on the attractive car exterior was painted not only the destination but a catalog of the principal points reached en route. For example, the cars of one line in Washington carried a legend such as this: "Mount Pleasant, Capitol and B. & O. Depot via 14th Street and Pennsylvania Avenue."

With the advent of larger and more complex railway systems such plans fell into disuse on account of the desirability of having all the cars of the company interchangeable. Dash signs, roof signs, and finally the illuminated roller signs have all been used to impart the desired information. Of course, with any type of changeable sign the space available to display routes and destinations is far less than when the whole car body could be used for the purpose. This is particularly true with the roller sign, now almost universally used.

The great advantage of the roller sign is that when a car is changed from one route to another or from one destination to another a suitable sign is immediately available. The necessity thus to be able to transfer a car on short notice from one route to another presents somewhat of a problem to the sign painter, as there must be suitable names on the sign roll. If a car may be operated on many routes it is necessary to have a great number of names and the roll, therefore, assumes considerable length.

In an effort to reduce the length of the roller curtain and thus effect a minor economy, some railways have tried to devise destination names that would serve for more than one route. Sometimes this has been carried to the point of absurdity. Names that are almost meaningless are used simply because of their universal applicability. While this was mentioned briefly in an editorial in this paper last week, attention being called to the bad practice of using non-informative signs on cars out of service, the use of such terms is not confined to cars routed toward carhouses, but occurs in many other instances. Some examples are: "City Line," "Belt," "Downtown," "R.R. Station" and "Bridge."

Such designations are not inaccurate, perhaps, but they are often quite indefinite. The regular rider on a particular line may know which railroad station is meant, and some people probably know what "City Line" means. To the casual rider, or to the stranger in town, however, such designations mean very little. The regular rider knows where the car goes however it is marked and the company gets his fare anyway; but if a few fares from strangers can be gathered in by making it easy for them to know the car's destination this money is just extra profit. Hence, why not make the sign tell just as much of route and destination as space and ingenuity permit?



These D. U. R. Containers for Less-than-Carload Service Have 2½ Tons Capacity and Can Be Shipped Sealed from Origin to Destination

Demountable Containers Expedite Freight Handling in Michigan

By E. J. Burdick

Vice-President and Manager Detroit United Railway

A Special Truck Chassis and Demountable Containers Have Been Adopted by the Detroit United Railway to Pick Up and Deliver Less-than-Carload Freight Shipments with Maximum Economy—The Company Now Is in Trucking Business at Request of Wholesalers' Organization

A METHOD of handling freight in less-than-carload lots has been adopted by the Detroit United Railway to facilitate loading and unloading and allow through routing of the shipment without rehandling. Essentially the plan consists of the use of relatively small containers that can be loaded and sealed at the point of origin, and then carried either on any motor truck or more conveniently on a special chassis to a point where the containers are loaded on a special flat car of the railway. At the receiving end the process is reversed.

This arrangement saves nearly all the time formerly used in the trans-shipment at the railroad terminals, and permits a more intensive use of the railway's equipment. A description of both the mechanism and the manner of its employment are of interest.

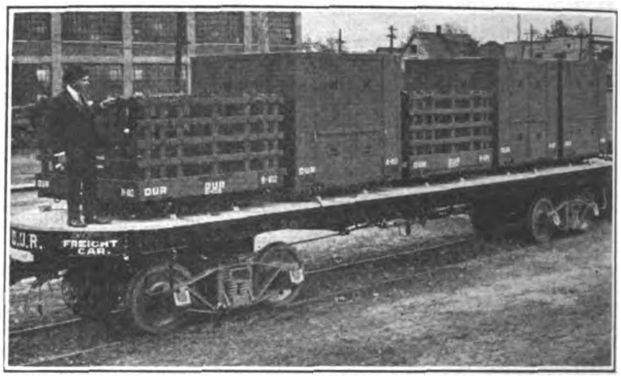
Careful study of the freight problem by the Detroit United Railway resulted in the formation of a subsidiary company to handle the trucking, both in long distance hauls and in pick-up and delivery service. In planning the basic idea as well as the major part of the developed details, we have contended that the motor car —both for passenger and freight—has its proper place in the field of transportation, and that it is advisable for electric railways to adjust themselves to the new system of motive power through co-ordinating the two, instead of refusing to recognize the utility of this suddenly developed method of conveyance.

The regulatory law recently enacted by the State of Michigan contains a general policy covering road conservation and wild-cat operations. The state policy having been determined, the Detroit United Railway was in a position to know what it had to face both in the way of possible competition and expansion. Its first definite step was the incorporation of the Detroit United Railway Trucking Company, with a capital stock of $500,000; all stock held for and in behalf of the interurban system.

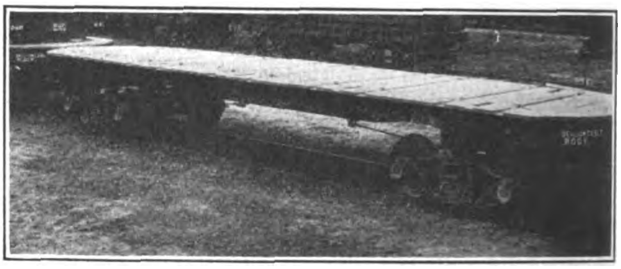
After several meetings of the department heads it was thought that, theoretically at least, the use of demountable truck bodies seemed the proper step. Such bodies could be hauled to established car lines, there transferred as units to flat cars and at the other end retransferred to trucks and distributed without disturbing the contents. This plan also allows a minimum use of the highway and a maximum use of established rights-of-way, very largely company owned. Michigan laws place a maximum upon truck load and length of motor trains. It appealed to the Detroit United, therefore, that economies which would result from placing several motor loads on one electric freight car and several cars in the trolley train, thus reserving the trucks themselves for the many terminal trips for pick-up and delivery, would give them a decided advantage over intercity trucking competitors using the highways.

ADVANTAGES OF THE PLAN

There are many advantages to follow such a co-ordinated trolley and truck shipping system as the Detroit United Railway is contemplating. According to the old system the product is packed at the shipping room in the factory, loaded on a truck body, unloaded at the railway freight house and loaded into the freight car. After arriving at the end of the railway trip exactly the same number of moves is made at the point of delivery.



Containers When Mounted on Flat Car Are Locked in Position



Flat Car Has Channels for Container Wheels. Locking Device on Axle of Container Engages Recessed Bar on Car

Compare this with the demountable body which can be placed either in the factory shipping or stockroom. The loaded body is moved to the truck chassis and carried directly to the electric railway car or loading platform and is transferred without disturbing the contents. This avoids four labor handlings in shipping, four in receiving, and makes substantial savings in the standing time for truck and driver. Fractional loads contained in packing cases of assorted sizes can be handled readily with this equipment with the same saving in labor at the freight station as is obtained with full container shipments. The fewer the number of handlings, the less will be the loss and breakage. As an additional precaution, the new type containers can be sealed by the shipper.

PERISHABLE PRODUCTS BETTER HANDLED

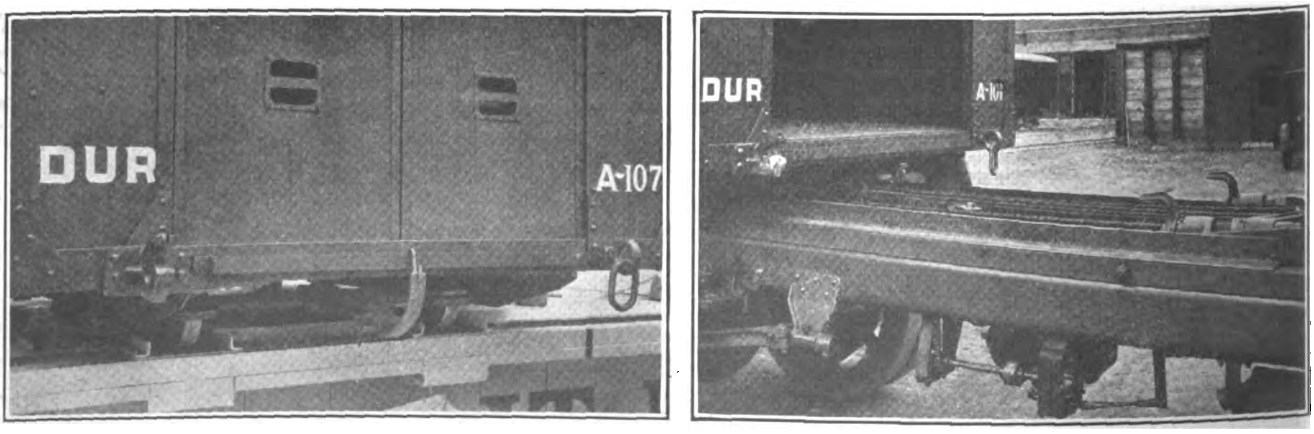
The handling of perishable products has always presented shipping difficulties. Every hour of delay decreases the value of the shipment. Consequently overnight delivery is a very desirable service. Under the new plan a demountable case can be left at the farm. When it is filled the farmer or the company, as may be agreed, takes it by motor truck to the nearest receiving station, where it is loaded on a car. In the morning, after the shipment has arrived at the rail terminal, it is delivered to its destination intact, with the contents in the best possible condition. It is under seal from the time the farmer does the packing until that seal is broken by the consignee.

Compare this method with the usual plan now followed in handling farmers' products to the market. The goods are subject to long delays, exposure to heat and cold and are passed through many hands. In addition, the crates are turned first on one side and then on the other as they are stacked and packed in warehouses and cars. Sometimes the product of one farm is so mixed with that of others in the selling that to a considerable extent identification is lost.

In addition to its advantages in the transportation of perishable farm products, the container arrangement is applicable to the handling of manufactured machine parts under a plan which may be called a "machine to machine" delivery. Parts may be put directly into containers at the machine as manufactured and delivered to an assembling plant in some other town without expensive packing and excessive handling costs. The construction of the containers makes it simple to move them about the plant by use of the ordinary type of industrial tractor. Extra containers may be provided so that they can be put directly into the assembling plant and the parts used as required with no additional handling.

At the present time the Detroit United Railway is engaged in trucking and is awaiting approval by the State Commission to put the new plan into general use. At the earnest solicitation of the Wholesalers' Bureau of the Detroit Board of Commerce, the Utility Commission authorized establishing a trucking line of 80 miles from the end of the Detroit, Jackson & Chicago Railway at Jackson, Mich., to Sturgis, Mich., through Hillside and Coldwater. This route is more extensive than the company had originally planned in connection with a contemplated pick-up and delivery service. The demand for speedier transportation from this territory to and from Detroit was such that the company agreed to try it out, using for the present time the ordinary trucking equipment.

Some idea of the extent of this service may be gained from the following schedule: Freight is received up to 4 p.m. at Detroit for Jackson and is carried over the



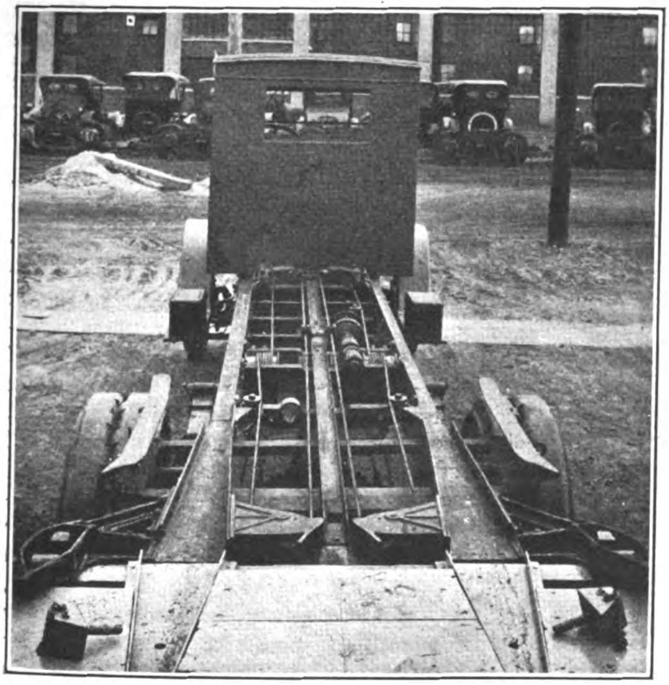
Arrangements for Handling the Containers

At the left, the ball-bearing wheels and locking hook and link are shown. At the right, the winding drum for loading may be seen. The large doors are removable to facilitate packing and unpacking.

electric line during the night. At 8 a.m. the following day truck distribution for Sturgis is started, which is usually completed by 3 to 4 p.m. that same day. In the reverse direction a pick-up truck leaves Sturgis at 8 a.m., picks up freight at intervening stops between Sturgis and Jackson, loads the freight into an electric freight car that afternoon and the merchandise arrives in Detroit the following morning. For this pick-up and delivery service a charge of 25 cents per 100 lb. is made over the regular steam road rate. This method has proved highly satisfactory and eliminates trucks using the highway between Jackson and Detroit. The service was started with 1½-ton trucks, which have been replaced with 5-ton chassis, all equipped with the demountable apparatus but using for the present the ordinary type of body.

THE MECHANICS OF THE CONTAINERS

How to put on and take off the bodies from the truck chassis was found one of the great problems to solve. Cranes on every car and cranes at every loading station spelled a big investment which seemed impracticable from the railway standpoint. Attention was called to a worm and endless chain device made by the Ideal Truck Equipment Company of Chicago as a possible solution of the problem. An examination of what this company had indicated that the idea was there, but that it would have to be developed further to suit our needs. This was done through the co-operation of the railway engineers with those of the equipment company. The present device utilizes the truck motor to move the container on or off the loading platforms. This device does not prevent the chassis being used with a regular truck body in the ordinary manner.



Loading Mechanism and Channel Tracks Are Bolted to Chassis. Channelways on Rear Can Be Adjusted for Height to Meet Similar Channels on Platform. Hooks Hold Front Container to Truck

The loading and unloading mechanism mounted on the truck chassis consists of a superstructure containing a pulley at each end, over which is run a steel cable receiving its power from a winding drum through a chain and worm mechanism driven from the truck transmission. Flared channelways are provided to form a track for the containers. These may be adjusted vertically to align with similar channels on the loading platform of the freight house. An engaging hook on the cable pulls the container on or off the truck as occasion demands. The mechanism contains a locking device for holding the containers in position during transportation on the truck and a cutout device which automatically stops the operation when the load has been pulled into the proper position. The rear container is stabilized in its position by side bearings. The forward container is held by hooks on the truck which engage its front axle. The containers are held in position on the flat car by similar means. Containers of this type have taken curves at speeds of 60 m.p.h. without slipping from their positions.

The containers, developed with the co-operation of the Fisher Body Company, are built up of light but rugged angle-iron framing with permanent corner panels of plywood which cover approximately one-third of the area on each of the four sides. On the bottom, two substantial sills are formed of 3-in. x 5-in. x 5/16-in., 8.2-lb. steel angles which carry the cast-steel bearing housings for the support of the wheels, axles and locking device. The wheels, which are flangeless, with a diameter of 9¼ in., are mounted on ball bearings and travel in steel channel tracks on the chassis, loading platform and flat cars. The wheel gage is 31 in., and the axles are spaced on 4-ft. 3-in. centers.

A substantial maple floor is laid over the sills. The entire framing structure is reinforced with gusset plates and brackets. Approximately two-thirds of the area on each of the four sides is inclosed by a pair of doors extending full height. These doors are arranged so that they can be entirely removed to facilitate packing and unpacking, leaving an opening 48⅜ in. wide. A locking bar holds them securely in position so as to make the closed container entirely weatherproof. The weight of the complete equipment, including the auxiliary mechanism on the chassis, is comparable with the weight of an ordinary oak van truck body of equal capacity. The inclosed half-sized unit has over-all dimensions approximately 6 ft. 6 in. wide and 7 ft. 6 in. long. The over-all height from wheel tread to roof is 6 ft. 10 in. and the height from floor to roof of the container is 5 ft. 9¾ in. Each of such half-size containers is designed for a capacity of 2½ tons.

For the shipment of goods which do not require protection from the weather an open type of container has been developed. This has simple stake sides, but is mounted on the same floor as the inclosed container described.

Using a 5-ton truck chassis, either one full size or two half size stake or inclosed type containers may be carried.

The accompanying illustrations show the type of construction employed and the arrangement of containers on both truck and flat cars.

Annual Meeting of F.E.S.

THE annual meeting of the American Engineering Council of the Federated American Engineering Societies will be held Jan. 8-11 at the Shoreham Hotel, Washington, D. C. The sessions will include a Public Works Conference on Wednesday, sessions of the American Engineering Council on Thursday and Friday, and a banquet for the A. E. C. and delegates on Thursday evening.

Trainmen and Community Work for Safety*

San Diego Trainmen Share in Safety Savings According to Car-Hours Worked—Citizens Organize to Reduce Street Hazards

THE San Diego Electric Railway has recently made a change in its method of distributing its bonus to the trainmen from the "Safety Fund." This fund has been in force since 1914, when the company announced a plan for stimulating among the platform men a more personal interest in accident prevention and the safe operation of cars. It set aside in that year 3 per cent of the gross revenue, out of which was to be paid all the claims for personal injury, property damage, outside law, courts, including witnesses, medical, hospital and other expenses and announced that the rest would be divided among the car men on a car-hour basis. In other words, the man who put in the greatest amount of platform hours participated to the greatest extent in the savings.

Five platform men were chosen to represent the car men in connection with this fund. They were called the safety committee and held meetings one night each week to review the accident reports of that week. Having the experience of car men themselves, they could readily see the mistakes that their fellow workers made, and it was the duty of this committee to call to the attention of the men connected with an accident where a mistake had been made in judgment and where pure carelessness played a part. For this service the members of the committee were paid $3 apiece a week, this sum being taken from the fund.

Up to 1923 it is estimated that the car men in San Diego have been able to divide close to $100,000 through this fund, many of the checks to individuals running considerably over $100.

The system has worked very satisfactorily for both company and men, and there has never been any thought of abandoning the principle. Experience has shown, however, a few desirable improvements. Thus, it was found that many men who had had accidents were receiving at the end of the calendar year proportionately as much as those who had had no accidents at all. Hence, beginning with Jan. 1, 1923, a plan was adopted to equalize the bonus on the basis of the man-hours worked and also of the number of accidents each car man had had. A slight change was made also in the amount of money assigned to the fund, which was changed to 3 per cent of the gross revenue from the transportation of passengers up to and including $1,000,000 and 2 per cent on the next $500,000.

The method of computing immunity from accidents is put on a monthly basis; that is, in each month that a man has no accident for which he is responsible, he is credited with 8.33 per cent (which is one-twelfth of 100 per cent). At the end of the year the percentages thus obtained by each man are totalized, the men are divided by these aggregate percentages into several classes, and the per cent that each class bears to the total is ascertained. These percentages will then represent what per cent will be taken of the total remaining in the fund and divided among the men in each individual class.

The total number of hours worked by the men for the year in each class is then divided into the total amount of money available for the class to arrive at an hourly rate, and the amount of money for the class is then divided among the men in the class according to this rate and the individual hours worked. To participate in this plan, a full month must be worked with a lay-off allowance for regular men of not more than four days per month and for extra men of not more than six days per month.

All platform men who may be detailed by the transportation department to temporary work, such as selling tickets, work-car service, traffic count, dispatching on account of construction, flagging on account of construction, acting in the capacity of relief receiver or temporary inspector, do not lose the credit of 8.33 per cent because of failing to put in the required number of days on platform work. However, the total number of days worked during the month, which includes the number of days that a man may have put in on the cars and on his temporary work, must equal the number of days he would have been required to put in on the cars had he remained on his regular run and not been detailed to the other work.

The responsibility for all accidents is decided by the safety committee.

SAFETY CO-OPERATION NOT LIMITED TO COMPANY EMPLOYEES

While realizing that the consummation of any safety program is mostly dependent upon its own efforts and that of its own employees, the company realizes that the co-operation of the public is also most necessary. Having started the practice of caution at home, it felt it was justified in asking for the co-operation of the public and was fortunate in securing the co-operation of the heads of various civic bodies in organizing what is known as the San Diego Public Service Committee, whose purpose is to eliminate, so far as possible, all traffic accidents.

Fifty citizens volunteered to act as a vigilance committee in reporting careless or reckless automobile drivers to the executive committee. The committee in turn writes a courteous letter of warning to the driver, and three such warnings constitute sufficient reason for his arrest. This committee meets at luncheon every Monday, and its duties are not alone directed to the automobile hazards but to anything that constitutes a menace upon the streets. The result of this plan, conducted under the direction of a temporary organization, has proved so satisfactory that it has reecntly been decided by the citizens to make the committee permanent.

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[*] This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.

Standard Watches Insure Accurate Time*

SOME companies operate under the theory that because street railway schedules are subject to so many interruptions, it is not particularly important for the men to have accurate timepieces. On the El Paso Electric Railway system, however, it is believed that the very fact that it is difficult to maintain good schedules makes it imperative for the operators to have the correct time. During the year all trainmen have been required to secure regulation watches of standard makes, and these watches are inspected twice a month and a record of their condition is kept. This tends also to induce greater effort to keep cars on time.

Traffic Problems in a City of 70,000

A Recent Traffic Analysis Made of the Charleston (S. C.) Electric Railway System Disclosed a Number of Possible Improvements and Economies, Even Though One-Man Cars Were Being Used Almost Exclusively

THE transportation situation in Charleston, S. C., as described in the survey recently made for the company by John A. Beeler, New York, shows a condition which probably has parallels in a number of other cities of like size. In 1910 Charleston had a population of about 59,000 and in 1920 of 68,000. The street railways in the first part of the last decade were fairly prosperous, showing from 1911 to 1914 an operating ratio of from 67 to 69 per cent, with operating revenue in the neighborhood of $400,000. During the next four years the operating ratio increased to from 72.3 to 77.9 per cent, while in the last five years it has been over 90 per cent for every year. For every year except 1920 it was over 97 per cent, and in 1921 and 1923, based on the first five months' operation, it was more than 100 per cent. During the war riding greatly increased because of activity at the Charleston Navy Yard, but since 1920 traffic has gone back to about the trend of the pre-war figures. There is no jitney competition.

The report of the Beeler organization suggests a plan by which the company will be able to make a saving of $148,530, or about 25 per cent of the operating expenses, and still serve the city as well as if not better than with present service, in spite of the fact that operation in Charleston has been largely by one-man cars. Since the completion of the report it has been accepted by both company and city. An abstract of the report follows:

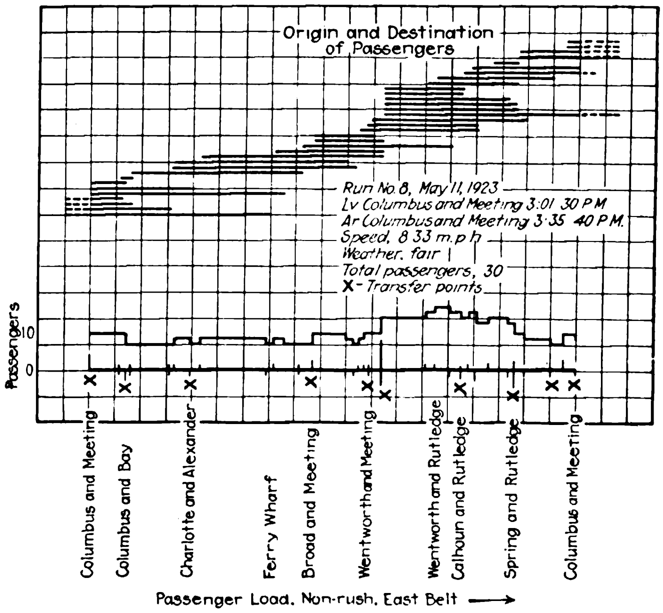
RAILWAY CONDITIONS IN CHARLESTON

The Charleston railway operates a total of 39.44 miles of track, of which about 10.7 miles are on the interurban line connecting North Charleston and the Navy Yard with the city. The balance is on the city lines. The service calls for the operation of thirty-four base cars and ten additional during the rush hours, making a total of forty-four cars in daily service. In 1922 the system transported approximately 10,000,000 revenue passengers and had a gross operating revenue of $634,000.

The city of Charleston is one of the oldest in the country, having been founded by the British in 1670. The growth has been slow but steady from the first census in 1790, when it had a population of 16,000, to the present time, with its population of 67,957. This population is fairly evenly divided between whites and blacks, there being 35,585 of the former and 32,372 of the latter. The distribution of races throughout the city is likewise quite even, except for a few localities. The total population, including that of the contiguous territory served by the interurban, is approximately 72,000.

The present incorporated area is approximately 3 miles long and 2 miles wide and is bounded by water on three sides. Fully two-thirds of the people live within one mile of the business center of Charleston. This proximity to the business district encourages walking and tends to a low riding habit. The accompanying maps indicate that there has been a tendency to overtrack the city. There are four lines of tracks running lengthwise and four crosswise.

The revenue rides per capita per annum was about 130 in the period just preceding the war. This figure dropped slightly during the first two years of the war, but after the United States entered the conflict the Navy Yard began increasing its forces and the peak of over 220 rides per capita was reached in 1920. Since then the drop has been precipitous, due to the general industrial depression and the fact that very little work is going on at the Navy Yard. In consequence, the rides per capita based on the first five months of 1923 is back to the pre-war figure of 130 per annum. Fluctuations in the total passengers carried by years are shown in one of the charts on page 1086.



Typical Graph Showing Passenger Loads During Non-Rush Hours on East Belt Line

In addition to the lessened business activity, the increased use of the automobile has, no doubt, had some effect on the street car riding habit. There are about 4,500 motor vehicles of all classes in the city. However, there is a general increase in the use of the automobile throughout the United States, and in spite of this fact most street railways are showing an increase in passengers carried.

The railway operates six routes, five of which are city lines and one interurban. Comparative financial and operating statistics, by routes, for twelve months' operation based on May, 1923, are given in Table I. As will be seen from the table, every one of the city lines shows a deficit.

The volume of service rendered is remarkably good. Rarely does one find passengers standing even during

TABLE I—PASSENGER REVENUE AND EXPENSES PER CAR-MILE BY LINES, CHARLESTON

Annual and average, based on operations in May, 1923

Line	Car-Miles	Passenger Revenue	*Operating Expenses	Operating Deficit	Average Cents per Car-Mile, 1923: Passenger Revenue	*Operating Expense	Deficit	Car-Miles per Day
Belt	470,700	$117,240	$121,000	$3,760	24.91	25.7	$0.79	1,284
Broad Street	261,700	50,500	68,040	17,540	19.30	26.0	6.70	719
King Street	194,000	72,975	79,730	6,755	37.62	41.1	3.48	524
Meeting Street	155,700	32,820	39,700	6,880	21.09	25.5	4.41	426
Rutledge Avenue	371,400	96,640	109,190	12,550	26.02	29.4	3.38	1,036
Suburban	488,500	172,810	166,580	†6,230	35.37	34.1	†1.27	1,399
Total	1,942,000	$542,985	$584,240	$41,255	27.96	30.1	2.14	5,388

* The amounts shown for operating expense include taxes. Operating costs have been determined from the system averages and by making allowances for differences in type of equipment and car speeds on the various lines.

† Surplus.

the rush hours. In fact, it is not a question of furnishing seats but more a question of passengers to fill them. The company has made no effort to curtail the service. In fact, it has steadily increased the number of car-miles operated. The rate of fare is the same as last year, viz., 7 cents cash, or four tokens for 25 cents.

A comparison of operations in Charleston with those of street railways elsewhere is given in Table II. In the first column are the latest available figures from reports of the American Electric Railway Association. The second column gives the Charleston railway operations for the same periods as covered by the association reports.

TABLE II—COMPARISON OF CHARLESTON AND OTHER CITIES

	A. E. R. A. Electric Railways	Charleston Railway
Average rate of fare in cents	7.13 (a)	6.02
Annual revenue per capita	$12.70 (b)	$8.81
Operating revenue per mile of single track	$20,292 (b)	$16,080
Operating revenue per car-mile in cents	45.9 (a)	30.8
Operating expenses per car-mile in cents (d)	36.2 (a)	33.1
Operating ratio, per cent (d)	78.97 (a)	107.37
Taxes, per cent of operating revenue	7.13 (a)	9.48
Revenue passengers, per cent (c)	inc. 6.63 (a)	18.05 dec.
Revenue passengers per car-mile	6.2 (a)	4.9

(a) Average of eighty-one urban railways for first four months of 1923.

(b) Average of fifteen cities, 60,000 to 80,000 population, for year 1922.

(c) Increase or decrease compared with same period 1922.

(d) Including taxes.

The average fare is 16 per cent lower than the average elsewhere. The density of business, as represented by the operating revenue per mile of track, is 26 per cent lower in Charleston. Even though the fare were the average rate, viz., 7.13 cents, and there were no change in the riding habit, the volume of business would total only $16,100 per mile of track, or less than 80 per cent of that in the other cities last year. The operating revenue per car-mile in Charleston is less by nearly one-third and the operating expenses per car-mile about 10 per cent less. It is notable that the total receipts per car-mile in Charleston are 15 per cent less than the operating expenses of the average company.

The Survey

To determine what readjustments in service could be made without disturbing the trend of travel, considerable field work was necessary. Traffic counts were taken at all of the principal transfer points, the peak load points and points where there was considerable interchange of traffic—seventeen locations in all. Each point was counted from 6 a.m. until 12 midnight for a two-day period and the results averaged. The counts were taken on weekdays when the weather was fair and other conditions such that normal traffic would be expected. The men stationed at these locations took a record of every car passing, noting the following: Route, destination, direction, car number, time of day and the number of passengers arriving at and leaving the point. The results of these observations were tabulated and charted. Records were also made for a number of typical trips of all stops, the location and volume of the passenger interchange, the time at time points, delays and any features which might influence the movement of the car. On three lines the origin and destination of each passenger were observed as further aids in determining possible readjustments on these routes. Charts were prepared from these rides, and a typical one showing the origin and destination of each passenger is presented on page 1081.

Cars Should Be Rerouted

In Charleston, as in most cities, the greater part of the demand for transportation is from the residence sections to the business section of the city. A considerable amount of the company's business is the result of the demand for service between the city of Charleston and the Navy Yard and North Charleston, which is cared for by the Suburban line. Since the business district is not confined to any one section, there is also a demand for cross-town service as a means of connecting the various civic centers and providing transportation between the hotels and the Union Station. This class of service encourages the use of street cars by the patron who has only a short way to go. Service which caters to the short-haul rider, the patron who enables the company to earn money, must be made as direct, speedy and generally attractive as possible.

The present and proposed routes are shown on page 1085. It is believed the new routing will serve the city better than the present one. It will provide the average patron with faster and more direct service and it will eliminate much of the waste in the present service, especially duplication and operation in unproductive territory.

The routing of the Suburban and Meeting Street lines will remain unchanged. The King Street line will loop back via Calhoun, Meeting, Broad and King Streets, resulting in one-way operation on the congested portion of King Street between Broad and Calhoun. On this portion of the line there is only one track now, because of the narrowness of King Street. The new routing will eliminate the necessity of cars now waiting at turnouts in this single-track section.

On the Rutledge Avenue line the detour to President Street will be eliminated and in the downtown section the cars will loop back via Meeting, Broad and King Streets. This will remove some of the excess service running to the Battery. A complete rearrangement of the Broad Street and Belt lines is recommended which will eliminate most of the present duplication of routes.

The cost of the additional special trackwork required to make this rerouting effective should not exceed $12,500.

The co-operation of the city authorities in the matter of regulation of vehicle traffic will be required for best results in obtaining a prompt movement of cars. The fact that costs due to accidents and damages have increased 145 per cent since 1913 illustrates the need of better traffic regulation.

Parking should be minimized on streets which have a large volume of traffic. Secondary streets having little importance as thoroughfares should be used for this purpose. Among other things, automobiles should be required to stand parallel to the curb with the adjacent wheels within 6 in. of the curb. No parking should be permitted opposite a trolley loading space.

SERVICE READJUSTMENTS

The company is at present using an up-to-date form of schedule modeled after the A.E.R.A. standard. In making new schedules to conform with the routing changes, the use of this form should be continued. The service readjustments were determined after a careful check of the riding habits on the various lines. Barring irregularities, the proposed schedules will furnish as many seats as passengers during every hour of the day, which is certainly liberal. In fact, such an arrangement is impracticable in many cities. An outline of service changes are summarized in Table III.

All of the proposed headways are more than sufficient to meet the traffic demands and are in equal divisions of an hour, so that cars will pass a given point at the same time after each hour. This is of great value to patrons and tends to increase riding.

The new schedule calls for 8.70 car-miles per car-hour instead of 7.91 as at present. Slow operation tends to discourage riding, waste power and increase accidents. It is also the general experience that schedules which are too slow tend to carelessness on the part of the operator. If the motorman is obliged to keep busy he will be more watchful and fewer accidents will be the result. The reduced congestion on King Street will be a large factor in minimizing the delays on that particular line.

At present all of the lines with the exception of the King Street and Suburban lines are operated with one-man cars. It is the intention of the company to put one-man cars in service on King Street as soon as a sufficient number of the cars are equipped with safety devices. This is in line with the most modern practice.

Expressed in terms of the different types of equipment, the total daily car requirements are as follows:

	Two-Man	One-Man	Trailers
Present	18	25	3
Proposed	9	21	3
Saving	9	4	..

This results in a saving of nine two-man cars and four one-man cars. The saving in the one-man cars will be especially appreciated as a shortage of this type was inevitable with the beginning of one-man operation on King Street under the present system of routing.

GENERAL IMPROVEMENTS DESIRABLE

There are a number of factors influencing the quality and cost of service which often can be improved if attention is directed to them. Suggestions particularly applicable in Charleston are enumerated in the following paragraphs:

Some confusion exists at present as to the exact location of passenger stopping places. Stops are made occasionally at a number of short side streets where none is authorized. The far side stop at transfer points was abolished, but this rule is not definitely followed. On the Suburban line, where there are definite stations, they are marked with small enameled signs, but some of these are entirely effaced. To mark definitely the stopping places of cars, the trolley poles at these locations should be painted with a white band about 3 ft. wide at a suitable height bearing the words "Car Stop" in black letters. The use of this type of sign is almost universal throughout the country and has been found very satisfactory wherever tried. It is plainly visible from a distance, and it is cheaper and more permanent than any other device.

The stopping places on the city lines average about fourteen to the mile, while the actual stops made vary from 4.3 per mile on Rutledge to 7.7 per mile on King. The Suburban line, with 8.4 stopping places per mile, averages 3.8 actual stops for the same distance. Most of the stops are made in the delivery area and some are at insignificant alleys or in the middle of the block. These superfluous stopping places should be eliminated, not only for the improvement of the street car service but as an aid to the movement of general traffic on these busy streets. City stopping places should not be closer than eight to the mile in order to secure satisfactory results. To make eight stops per mile requires a stop every forty-five seconds and is all that the most modern equipment and a skilled motorman can do and maintain any schedule worthy of the name.

The present schedules do not provide for a layover or scheduled standing time at line terminals. While the allowed time is sufficient to provide for minor delays, better operation would be obtained if the scheduled time were faster and a short layover provided with the time gained to care for the delays that are bound to occur.

The present practice in Charleston is for a patron to state what transfer he wants when he boards the car. The conductor, however, does not issue the transfer until the patron is leaving. This delays both the

TABLE III—PRESENT AND PROPOSED ROUTES, OPERATING DATA AND WEEKDAY SCHEDULE

Line	Round Trip, Miles		Base Headway (Minutes)		Car-Miles		Car-Hours		Car-Miles per Car-Hour	
	New	Old	New	Old	New	Old	New	Old	New	Old
Belt	4.52	4.74	10	7	1,030	1,284	133	168	7.73	7.64
Broad Street	....	6.44	..	10	.....	719	...	97	.....	7.42
Columbus-Spring	1.95	.....	15	..	140	.....	18	...	7.80	
(a) King Street	5.13	5.62	10	12	555	524	72	76	7.70	6.90
Meeting Street	7.64	7.64	30	20	290	426	38	56	7.64	7.61
(b) Rutledge Avenue	7.87	9.56	10	10	930	1,036	118	132	7.87	7.85
(c) Suburban	18.60	18.60	30	20	1,140	1,399	92	152	12.39	9.21
Totals and averages					4,085	5,388	471	681	8.70	7.91

(a) On King Street before 7 a.m. and after 9 p.m. a twelve-minute headway should be maintained.

(b) In addition to a special trip per morning and evening for colored workers at the fertilizer plant.

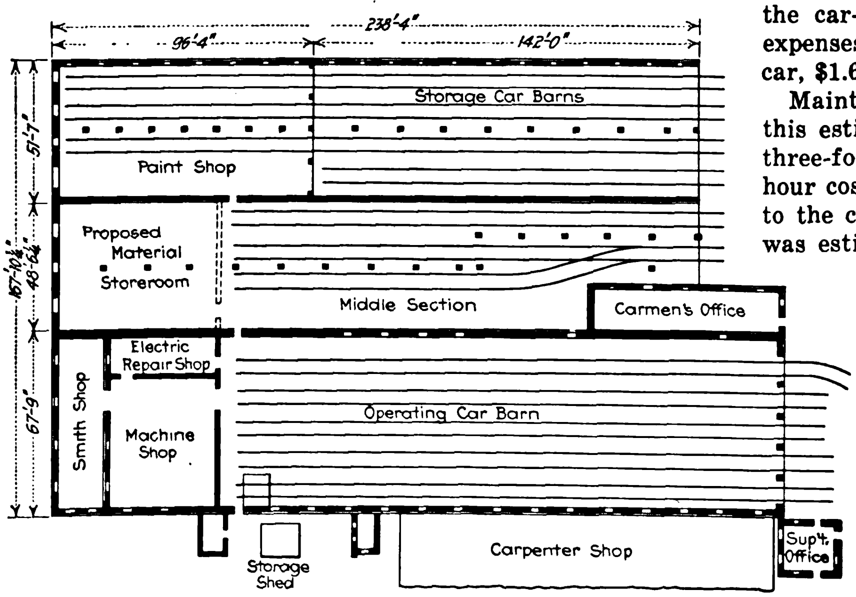
(c) For the present demands, six extras should be operated in the morning and eight extras at night. This includes the two-car and three-car train to the Navy Yard at night. The car-hours and car-miles shown include the extras.

alighting and boarding passengers. It would be much better if the transfers were issued to passengers only when they board the car.

The center-entrance cars are equipped with two doors, but only one of these, the forward one, is used. Keeping this door closed gives a little additional seating space, but it would be better to use both doors as an aid in speeding up and improving the service.

The track switches now in use in Charleston are hand operated, by short switch-irons, which make it necessary for the motorman to leave his post to throw the switch. With one-man cars, this makes serious delay and fare collection becomes more difficult. Electric switches should be used wherever the headways are five minutes or less. Switches not electrically operated should be thrown from the car. Hand switch-irons long enough to permit this operation should be provided.

Observations showed that while there was opportunity for a great deal of coasting, very little was done.



Plan of Carhouse and Shops, Charleston, with Proposed Additions of Storeroom and Carpenter Shop

One of the standard forms of power saving devices should be adopted. Their efficient use reduces power consumption and gives more comfort to the passengers, as it necessitates more uniform acceleration and braking. Probably 10 per cent of the power cost can be saved after the power saving devices are paid for.

Reports from eighty-one electric railway companies in the United States for the first four months of this year show that approximately 7.1 per cent of the operating revenue is paid out in taxes. For the same period, the Charleston railway paid 9.5 per cent of its operating revenue for this purpose. Some substantial relief should be afforded the railway. In addition to the regular taxes the company paves a portion of the streets between and adjacent to the rails. The amount of paving so required has recently been reduced 50 per cent. It should be eliminated entirely.

It has been the policy of the company not to set aside a reserve for renewals and retirements, but to keep the physical plant in condition by charging all current renewals to the maintenance account. Only actual additions to the plant, such as the addition of safety devices to cars, are added to capital account. The generally accepted practice, however, and one which guarantees greater protection of property and minimizes the fluctuations in the operating expense, is to set aside an annual reserve for renewals and retirements and to use it as needed. The company should accrue annually a sum for this purpose.

SAVINGS POSSIBLE BY PLAN

Table IV shows in detail the present operating cost per car-hour of the different types of equipment. An analysis of the savings possible from reducing the car-hours shows that for each hour saved expenses will be reduced as follows: Two-man car, $1.658; one-man car, $1.009; trailer, $1.002.

Maintenance of equipment is not included in this estimate because it is considered later, but three-fourths of the maintenance of way car-hour cost was taken, as the ratio of the car-mile to the car-hour reduction is 3 to 4. No change was estimated for the general expense or taxes, so that the estimated savings should be conservative.

The total annual reduction in expenses that should follow all changes recommended is shown in Table V.

SHOPS AND CARHOUSE

Maintenance of equipment costs increased steadily until 1921, when the peak was reached. At that time the cost per car-mile was 6.1 cents, or 454 per cent higher than in 1913. The present figure of 5 cents per car-mile is 354 per cent greater than before the war. This indicates either abnormal renewals or need for greater economy in the shops or both.

The general arrangement of the shops is good except that a storeroom should be provided in the rear of the middle portion of the carhouse as a time saver when securing materials. When the time is propitious a carpenter shop should be built in conformity with the rest of the surroundings. The completion of the remodeling of the cars, a more efficient use of labor and the decrease in the number of cars in service due to the new routing proposed will make it possible to reduce the cost of labor and materials as estimated in Table VI.

By reference to chart No. 8 on page 1086 it will be seen that in 1913, which may be taken as a typical pre-war year, 5.3 per cent of the operating revenue

TABLE IV—PRESENT OPERATING COST OF DIFFERENT TYPES OF EQUIPMENT, BASED ON MAY, 1923, EXPENSES

	Present Cost per Car-Hour Two-Man	 One-Man	 Trailer
Power	$0.281	$0.188	$0.188
Maintenance way and structures	.338	.225	.282
Maintenance equipment	.459	.229	.153
Operation of cars	1.390	.960	.910
Damages	.163	.122	.122
General	.182	.164	.164
Taxes	.194	.146	.146
Total	$3.007	$2.034	$1.965

TABLE V—ANNUAL SAVINGS POSSIBLE BY CHANGES RECOMMENDED

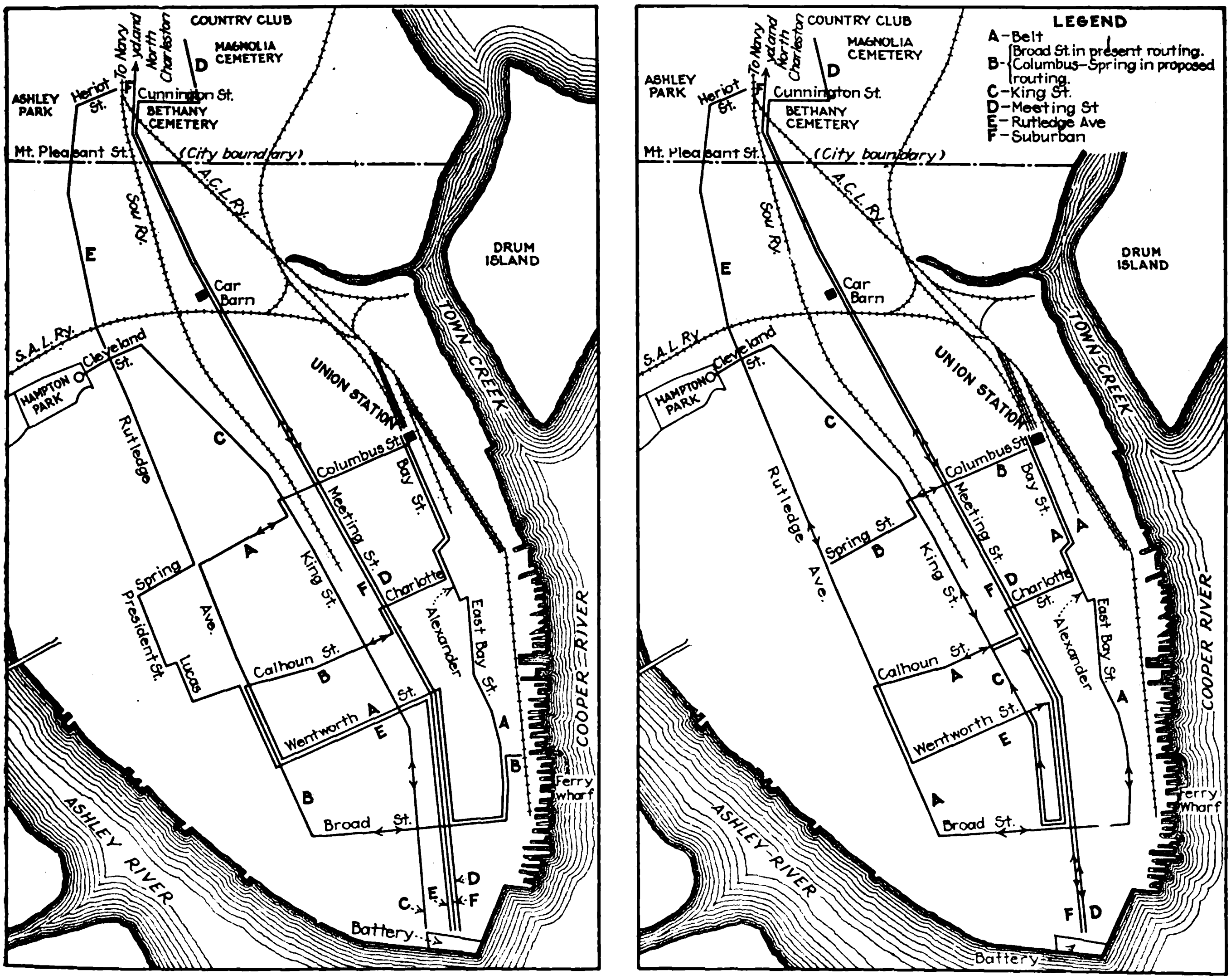
	Annual Saving
138 two-man hours daily at $1.658 each, equals $229 daily x 365 =	$83,600
70 one-man hours daily at $1.009 each, equals $71 daily x 365 =	25,900
2 trailer hours daily at $1.002 each, equals $2 daily x 365 =	730
Due to power saving devices	4,100
Shop readjustments (labor)	14,800
Shop readjustments (material)	12,700
Carhouse readjustments (labor)	6,700
Total	$148,530

TABLE VI—ESTIMATED ANNUAL SAVINGS AT SHOPS AND CAR HOUSE

Payroll reduction (shops)	$14,800
Payroll reduction (carhouse)	6,700
Saving in materials	12,700
Total annual saving	$34,200

was required to cover maintenance of equipment costs, while for the first five months of 1923 16.5 per cent was required. Similarly, in 1913 these expenditures represented 7.8 per cent of the total operating expense, while now they are 15.5 per cent or double. This account should be normally about the same percentage of the total expense.

A very considerable portion of the increase in recent years is, undoubtedly, due to deferred maintenance. Some of it is due to renewals and betterments to the present rolling stock. As there is no special reserve for renewals of this nature, these costs are being charged directly to operations.


COUNTRY CLUB
MAGNOLIA CEMETERY
To Navy yard
North Charleston
ASHLEY PARK
Heriot St.
Cunnington St.
BETHANY CEMETERY
Mt. Pleasant St.
(City boundary)
A.C.L. Ry.
Sou. Ry.
DRUM ISLAND
Car Barn
S.A.L. Ry.
Cleveland St.
HAMPTON PARK
UNION STATION
TOWN CREEK
Rutledge Ave.
Columbus St.
Bay St.
Meeting St.
Spring St.
President St.
Lucas
King St.
Charlotte St.
Alexander
East Bay St.
Calhoun St.
Wentworth St.
Broad St.
Ferry wharf
COOPER RIVER
ASHLEY RIVER
Battery
A
B
C
D
E
F
LEGEND
A-Belt
B-{Broad St. in present routing. Columbus-Spring in proposed routing.
C-King St.
D-Meeting St
E-Rutledge Ave
F-Suburban

Maps Showing Present and Proposed Routes on the Charleston Railway

Arrangement of Shops

The general arrangement of the shops is shown in the plan on page 1084. They are well located with respect to the carhouse. The electrical, machine, blacksmith and paint shops are housed in the main brick structure. The carpenter shop, however, is a frame lean-to on the south side of the main building. This frame structure was recently enlarged by addition of a temporary shed to care for the increased work in connection with the remodeling of cars. The present carpenter shop structure will need rebuilding in a few years. By that time the company may expect to be on a better financial basis and a building should be constructed in conformity with the rest of the plant.

The material store house is located in the old power house across the street. This requires a walk of approximately 1,000 ft. when material is required. The rear portion of the middle section of the carhouse is little used except as a place to pile junk. It should be cleared out and used as a store room that will be readily accessible from the shops. The cost of making the store room changes should not be a great deal. The saving in time and labor in routing the materials should soon repay this expense.

The machine tools are in good condition and with the remodeling of the cars finished any replacement is hardly justified at the present time. A shaper or a milling machine would be a time saver in turning out light work. A check on the number of operations that would be done on this machine with the normal maintenance work should be made and the cost compared with that of similar work done by present methods. It is probable such an investment would be justified.

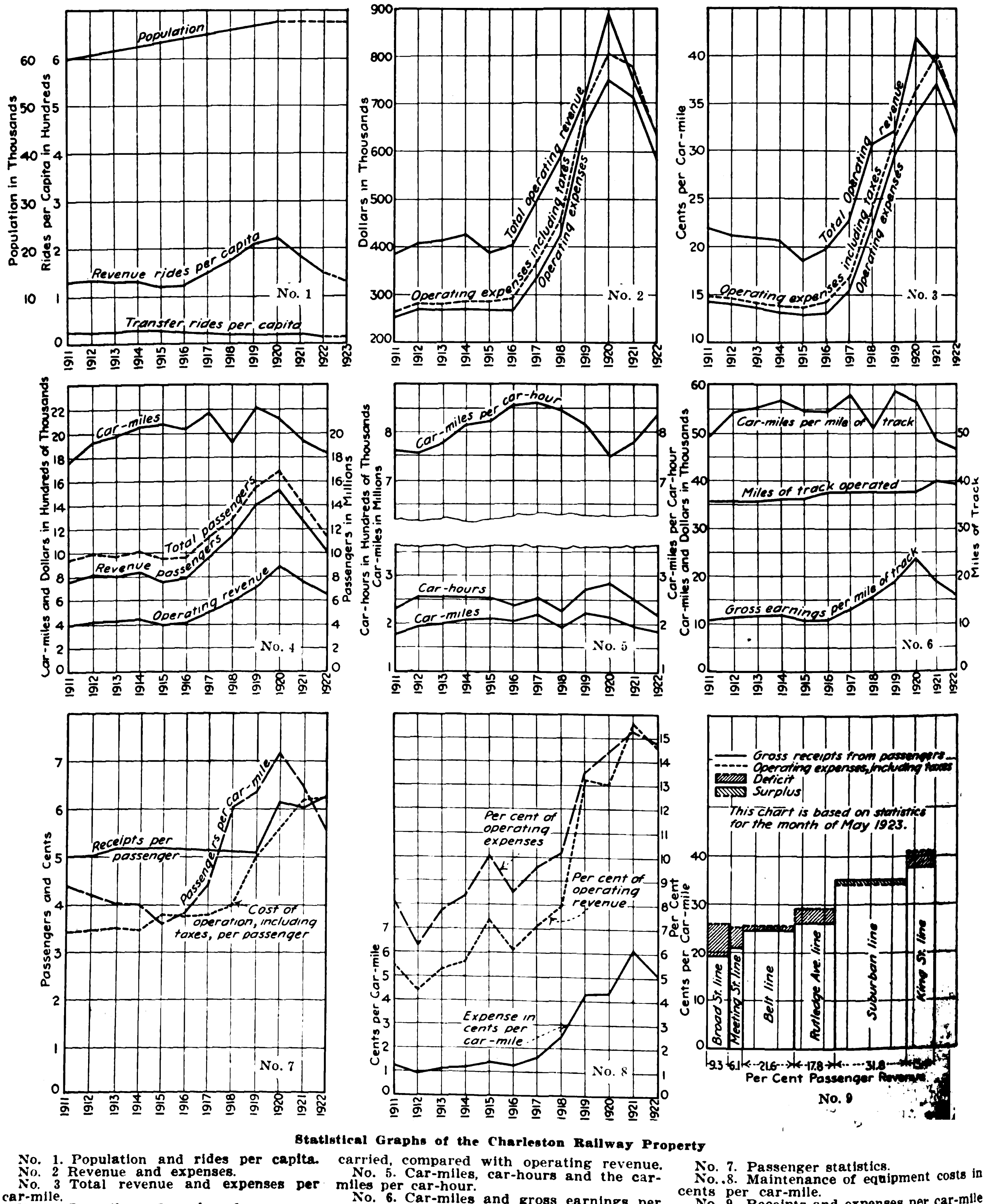
A large portion of the woodworking machines were purchased in 1921, so there should be no need for additions at this time.

With the remodeling of the cars completed, a reduction in the shop force is contemplated, leaving just enough help to care for the current maintenance. The decrease in the number of cars in service, with the proposed routing in effect, will reduce the labor requirements still further. Fifteen men may be dropped from the payroll, with a weekly saving of $364.50 from the present weekly payroll of $791.10. With a smaller force, administrative duties will be easier and a closer check on the work will be possible.

Based on the five months ended May 31, 1923, the annual cost of materials for equipment maintenance is $52,800. With the recommended routing effective the material costs should be reduced approximately in the same proportion as the number of car-miles operated, or an annual reduction in the material cost of $12,700 may be expected.

The carhouse can also be operated with a smaller force and the weekly payroll reduced at least $129.60.

The adoption of all of the recommendations in this



Statistical Graphs of the Charleston Railway Property

No. 1. Population and rides per capita.
No. 2 Revenue and expenses.
No. 3 Total revenue and expenses per car-mile.
No. 4. Car-miles and number of passengers carried, compared with operating revenue.
No. 5. Car-miles, car-hours and the car-miles per car-hour.
No. 6. Car-miles and gross earnings per mile of track.
No. 7. Passenger statistics.
No. 8. Maintenance of equipment costs in cents per car-mile.
No. 9. Receipts and expenses per car-mile by routes.

report should be of permanent benefit to both the public and the company. The faster and better distributed service should stimulate business. Reduced congestion will benefit the general public as well as the car rider and the user of the automobile. The merchants and property owners will benefit from the enlarged delivery area and the better distribution of cars through the business district.

The plan will enable the railway to take an important step toward being self-sustaining, as with the plan herein effective a saving of $148,530 in operating expenses can be made. Supplementing these economies, further steps may be taken to improve the net earnings of the railway in three ways: (1) By the people of Charleston patronizing the railway more; (2) by curtailing the proposed service and introducing further economies; or (3) by raising the fares.

The railway deserves more patronage as the low per capita earnings show. An increase of one dollar per capita, or 2 cents per week, would practically wipe out the deficit. The schedules and service proposed in this plan will readily care for 15 to 20 per cent more riders. A 13 per cent increase in the revenue passengers would enable the company to operate without a deficit. This may result from changes in population or from increased riding. If from the latter alone the riding habit must go up from 130 to 147, which, although more nearly what it should be, is a considerable increase over the present.

To curtail the service from that which is proposed is not desirable if any other way out can be obtained. Economies other than those recommended are not desirable from a service standpoint.

At the present time a combination of increased fares and more patronage is a practicable solution. If a straight 7-cent fare for adult city passengers were adopted it is estimated that the railway revenues will be increased $22,500 annually. Possibly the people of Charleston, when they understand this situation, will avail themselves of the service to a greater extent and thus tide over the necessity of either lowering the standard of service or of increasing the rate of fare above 7 cents.

Fares to be equitable must always be based on the cost of rendering service. High costs mean higher fares. As the costs recede the fares should do likewise. At no time, however, can any progressive community prosper with poor car service even though such service is tolerated by the public in order to secure a low rate of fare.

Capitalizing on the Coffin Prize

How the Chicago, North Shore & Milwaukee Railroad Is Turning the Winning of This Award to Good Account—Its Value as a Publicity Asset Is Being Fully Utilized in Newspaper Advertising, Window Displays and Company Publications—The Cover Design of the Prize-Winning Brief Has Been Reproduced on Dining Car Menus and on Attractive Souvenir Calendars

REALIZING the immense value of the Charles A. Coffin prize as a publicity and merchandising asset the management of the Chicago, North Shore & Milwaukee has been quick to apply it. The prize has also been put to use to give an incentive for building up a still greater pride and *esprit de corps* within the organization. The work already done has taken many different forms and still further applications are contemplated for the future.

As the first step in the program, the report of the Charles A. Coffin Prize Committee and the remarks accompanying the presentation of the prize have been made the basis of a series of large advertisements. Weekly insertions are being made in seven Chicago papers, five Milwaukee papers, two papers in Racine and two in Waukegan. In addition, these advertisements are being published in the local papers of Kenosha, Libertyville, Lake Forest, Highland Park, Winnetka, Wilmette, Glencoe and Evanston. This list includes practically all of the larger communities along the line.

A reproduction of the certificate of award was published first. This is being followed up by a series of seven advertisements quoting excerpts from the report of the committee. The seven advertisements are the same in form, the excerpts being inserted as shown in the illustration. Several of the other quotations are given below:

5. Because of improvements in construction practice, which have resulted in reduced first cost, reduced maintenance or greater reliability of service.

"Construction methods which are contributing to the general success of this company include new and better power station equipment; a program of rock-ballasting the entire system is 60 per cent completed; the old light rail is being replaced with 100-lb. rail and concrete and brick platforms are replacing wood at the stations."
—*From Report of Committee on Award.*

6. Because of particular success in conducting a safety program, and actually reducing the number and seriousness of accidents.

"In fostering greater safety in operation, this company has succeeded in reducing injury and damage claims to 1.82 per cent of the gross. The record was one accident per 16,081 car-miles in 1922. Lectures, safety meetings, safety recommendations. 'Safety First Car' and first-aid drill teams are part of the company's notable safety work."
—*From Report of Committee on Award.*

7. Outstanding accomplishments in development of good relations between management and employees.

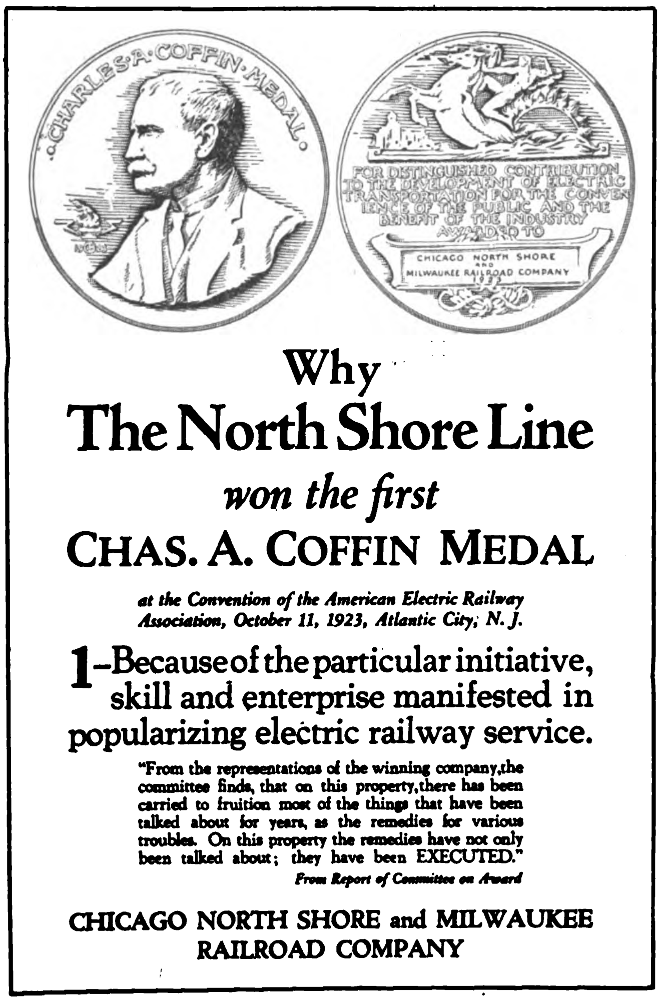
"The fact that your company has secured the award of the Coffin Foundation is proof positive that the greatest spirit of co-operation must have existed among all men concerned, in the operation of your railway system."
—*Mr. Emmons, Chairman Committee on Award.*

It is expected that this series will be carried still further when the existing program is completed.

AWARD ALSO USED IN ADVERTISING NEW SECURITIES

The value of the award as a merchandising asset has also been applied in a campaign conducted for the procurement of new capital. Advertisements for the sale of the company's 7 per cent prior lien stock carry a reproduction of the front and back of the medal with the following statement beneath:

"Awarded October 11, 1923, for distinguished con-


CHARLES A. COFFIN MEDAL
FOR DISTINGUISHED CONTRIBUTION TO THE DEVELOPMENT OF ELECTRIC TRANSPORTATION FOR THE CONVENIENCE OF THE PUBLIC AND THE BENEFIT OF THE INDUSTRY AWARDED TO
CHICAGO NORTH SHORE AND MILWAUKEE RAILROAD COMPANY
1923

Why
The North Shore Line
won the first
CHAS. A. COFFIN MEDAL

at the Convention of the American Electric Railway Association, October 11, 1923, Atlantic City, N. J.

1–Because of the particular initiative, skill and enterprise manifested in popularizing electric railway service.

"From the representations of the winning company, the committee finds, that on this property, there has been carried to fruition most of the things that have been talked about for years, as the remedies for various troubles. On this property the remedies have not only been talked about; they have been EXECUTED."

From Report of Committee on Award

CHICAGO NORTH SHORE and MILWAUKEE
RAILROAD COMPANY

An Example of General Newspaper Advertising in Which Excerpts from the Committee Report Are Quoted

tribution to the development of electric transportation." These stock advertisements are in addition to the general advertising series and are being run in the same papers in which the general advertising campaign is conducted.

USED IN WINDOW DISPLAY AND COMPANY PUBLICATIONS

Very shortly after the award was made a large scale reproduction of the medal was prepared and was made the center of a window display in the Edison Building, where the company's offices are located. This display created a great deal of comment and interest and has since been moved to the terminal passenger station in Milwaukee.

The company included a description of the award in the "North Shore Bulletin," which is a monthly booklet prepared for circulation among patrons of the line and residents along its route. A similar item was published in the "High Ball," which is a monthly employees' publication, and in the Chicago Elevated Railway's publications, the "Elevated News" and the "High Line." The combined circulation of these papers is approximately 75,000 monthly.

Framed photographic reproductions of the certificate which accompanied the medal have been hung in the various stations along the company's route. Four-color reproductions of the cover of the prize-winning brief have been utilized on the covers of the dining car menus, along with pictures of the front and back of the Coffin medal.

This colored cover design has been further utilized in making up a wall calendar. On each page of the date pad the front and back of the medal are pictured. It is planned to distribute the calendars as souvenirs at the opening of the new Wilson Avenue passenger station just nearing completion. In addition they will be mailed to a selected list of women representating various club and civic activities in the communities along the line of the road.

Bronze watch fob replicas of the medal have been made up. These are being distributed to employees and will also be used by the traffic department for distribution to employees of shippers doing business with the North Shore Line.

The management contemplates further application of the award in its general publicity program. It will probably be used as the basis for some of the posters with which the road has been so successful in the past in creating favorable attention and comment. By extension to its billboard advertising and to car card publicity it is expected that public confidence and good will toward the company can be still further stimulated through this evidence of merit presented by the industry of which it is a part.

How Economy in Current Was Obtained in El Paso*

THE business center of El Paso is very close to the river on the south, and the development of the city has been, therefore, confined to a northward growth. This growth has been made more difficult by reason of the fact that a chain of mountains extends through the northern part of the city, terminating just outside of the business district.

Innumerable hills and curves increase the kilowatt-hour consumption of the cars of the El Paso Electric Railway, as is evidenced by the fact that when an experiment with friction bearings was conducted by the company on the only level line operated, a lower power consumption was experienced with these cars than with the ball-bearing type on other lines. The total mileage of city lines in El Paso is 42.2 on a single track equivalent. Of this amount 22.1 miles is paved.

All of the company's cars are equipped with Economy meters, and a careful record is kept of each man's and each car's performance. An individual inspector is in charge of this phase of operation and keeps comparative records which are posted for the benefit of the men, and which also are published in the company's periodical, "Cactus Points." Where he finds that certain men are using more than the average amount of current, he studies the particular case and usually ascertains and corrects the cause.

The use of these meters by this Texas company, and the system in connection with them, have been instrumental in helping reduce the current consumed. This is shown by the average kilowatt-hours per car-mile for the system, which in 1920 was 1.765; in 1921 was 1.65; in 1922 was 1.52; and in 1923, based upon operation during a period of seven months, the kilowatt-hour consumption was 0.88.

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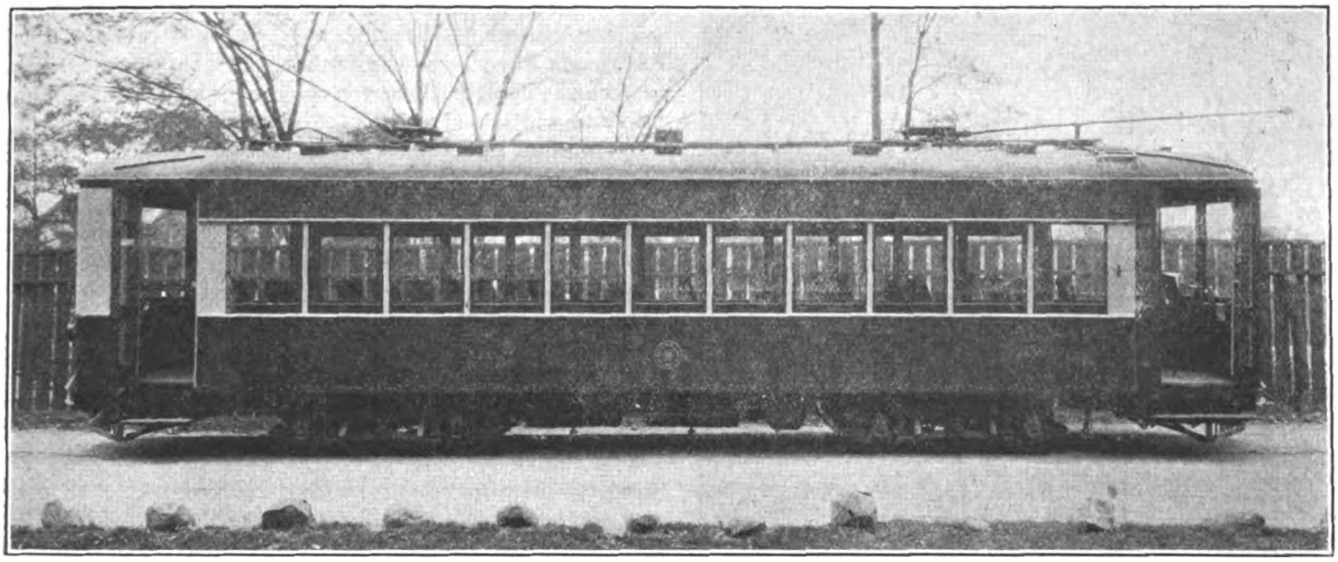
*This article is based on material included in the brief submitted to the Charles A. Coffin Prize Committee of the American Electric Railway Association by the company named.



Single Sash Windows of Unusual Height Admit Plenty of Light in the New Cars of the P-O Electric Company

Simplicity of Arrangement Features New P-O Cars

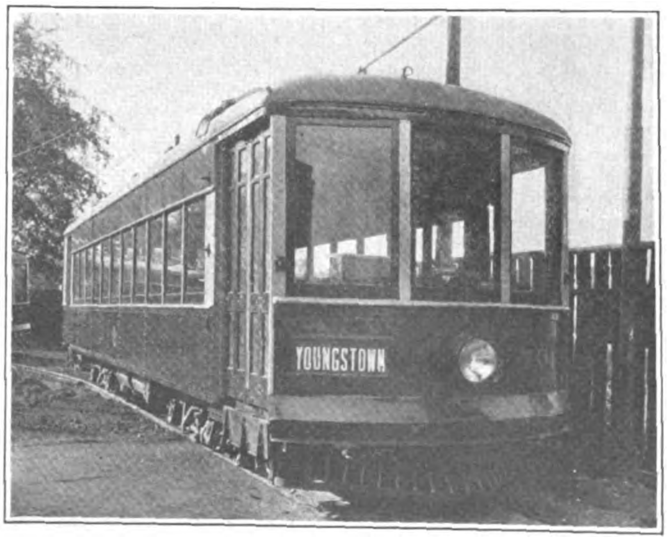
All Pipes, Wires, Switches, Engines, Etc., Are Inclosed in Cabinets—Advertising Cards and Luggage Racks Have Been Eliminated in Order to Improve the Interior Appearance—Woodwork Is of Mahogany

By Richard N. Graham
Manager of Railways Pennsylvania-Ohio Electric Company, Youngstown, Ohio

WITH the idea of creating a car which would bear the same relation to the ordinary interurban electric car that the coaches of the Pennsylvania-Ohio Electric Company bear to the ordinary bus, several departures from conventional practice have been made in the design of the new cars placed in service on Oct. 28. Three principal objects were sought. In the first place, simplicity of arrangement was desired for the purpose of facilitating cleanliness and improving the appearance of the interior. All pipes and machinery were, therefore, inclosed in cabinets. In the second place, the company wished to make the car as comfortable as possible for the passenger. In the third place, it was desired to speed up passenger movement, not only boarding and alighting but also within the cars, and doors and aisle were specially designed for this purpose.

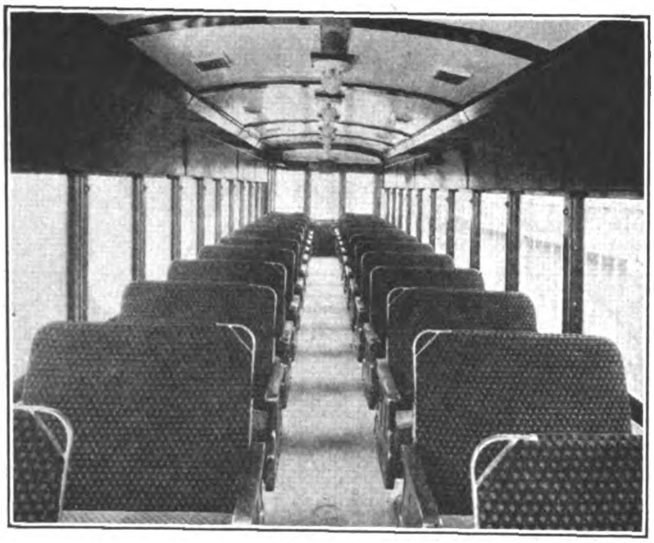
The cars are operated from Youngstown to New Castle, a distance of 20 miles, and from Youngstown to Sharon, a distance of 15 miles. On these routes the headway is thirty minutes throughout the day and evening until midnight. Both lines have comparatively heavy traffic, with considerable passenger interchange. This is particularly true of the Youngstown-Sharon line, where there are a number of very heavy loading points.

The new cars weigh 37,000 lb. and take the place of an older type interurban car weighing approximately 75,000 lb. Each car is equipped with four G. E. No. 265 motors of 35 hp. capacity. Four Westinghouse No. 317, 90-hp. motors constituted the equipment of the cars which are now being retired from service, but it is expected that the new cars will handle the same traffic at the same schedule speed as the cars for which they are being substituted.



Both Entrance and Exit Are Normally by the Front Door, but an Emergency Door at the Rear Is Also Provided

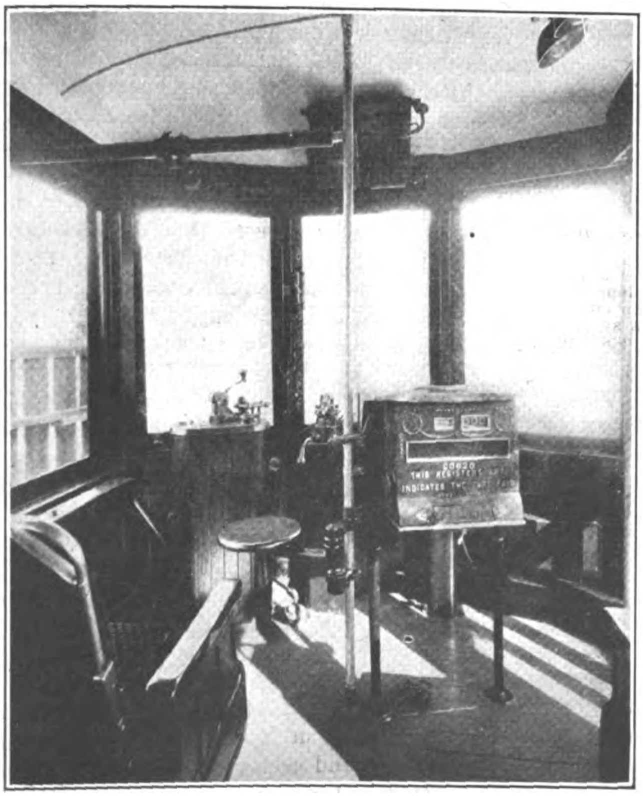
Because of the simplicity of the design and the quality of the material, the interior of the car has an unusually pleasing appearance. No stanchions of any kind are used in the car. Luggage racks and advertising signs have been eliminated. From the tops of the single sash windows up to the roof the sides are finished in genuine mahogany with a simple panel effect. The same finish is used for switch cabinets, controller, and the casing



Mohair Velvet Seats Are Permanently Fixed at a Comfortable Angle, and the Interior in General Is Free from All Unsightly Mechanisms

for the engineer's valve. All switches are inclosed in a Detroit switch cabinet, which is painted to conform to the general scheme of decoration. It is placed under the left front window out of the way of the operator or passenger. The unsightly pipes leading to the engineer's valve are inclosed in sheet-steel cover, finished in conformity with the woodwork. Where it was necessary to install conduits inside the car body leading to the control apparatus, they were similarly inclosed. A feature of this car, therefore, is the minimum display of apparatus. The machinery is of no more prominence than in the interior of a well-appointed automobile.

In order to admit plenty of light, the bottom panel of the side frame was made unusually low, so that the lower part of the window sash is just opposite the elbow of a seated passenger. The cars were constructed with single sash windows, so that this sash might have greater height. All windows are plate glass. The bulkheads have been eliminated and the end windows and those opposite the doors were made of the maximum possible width and height. The result is that even on a cloudy day in a region which has an unusually cloudy climate the interior of the car appears bright and cheerful.



Air Pipes Leading to the Engineer's Valve Are Hidden Behind a Sheet-Iron Shield

The elimination of the double sash and of all exposed piping or apparatus of any kind that would furnish a lodging place for dirt has facilitated the work of keeping the car interior clean and sanitary. Special washing facilities for these cars are now being installed in the inspection barn from which they are operated. For this purpose, a vacuum cleaning process will be used. As there is no provision made in the cars for bulletins, signs, notices, advertisements, or any other sort of publicity or propaganda, another fruitful source of dirt and trash has been eliminated. The company believes that the passengers should bring their own reading matter aboard the cars.

Carlines have been inclosed in mahogany cross-beams, while another beam runs longitudinally the full length of the car. Elsewhere the ceiling is finished in ivory white enamel. The ceiling thus has a beamed effect. This effect is carried out into the vestibule by a special sheet-metal vestibule hood, which also is finished in white enamel.

ADEQUATE LIGHTING AND COMFORTABLE SEATS

For artificial lighting at night, Brascolite lighting fixtures have been installed along the center of the roof. Each fixture contains a 93-watt light. In combination with the white enameled ceiling, already mentioned, these lights provide effective illumination, so that the passengers can read newspapers with ease at all points in the car.

Maximum comfort for the passenger is provided by the high back seats with deep spring cushions. The cars were arranged for single-end operation with the specific idea in mind of having a stationary seat that would have the proper pitch to be the most comfortable. Arm rests are provided on both sides of each seat. The seats are sufficiently roomy for two large men wearing overcoats to sit side by side in perfect comfort.

The floor is covered with battleship linoleum and the seats are upholstered in Chase mohair velvet of figured design. The color of the upholstery harmonizes with the mahogany trim. The operator's curtain corresponds in color and appearance to the upholstering of the seats.

An Ohmer fare register is installed on a mahogany cabinet containing pigeonholes for transfers and the operator's reports. Space is provided there also for two electric lanterns, one with a red bull's-eye and one with a white bull's-eye, which are used by the operator for signaling purposes instead of oil lights.

Ingress and egress of passengers are accomplished through a large double door at the front end. There is also an emergency door at the rear which can be opened by passengers whenever an emergency stop is made. The aisle is unusually wide, and the farebox is located so as not to interfere in any way with the free movement of passengers.

A single seat just back of the front door was originally included in the design, but this has now been eliminated and the sand box under this seat has been inclosed in a mahogany cabinet.

Keeping the Cars on Schedule*

Organization and Operation of Dispatching System of Kansas City Railways Is Briefly Told—Effective Check of Car Operation in the Field Has Served to Produce a High Standard of Service—Company Police Department a Great Aid

IN ORDER to correct unavoidable disarrangements of service at their very inception, the Kansas City Railways has developed a dispatching system which has contributed materially to the building up of increased patronage and has resulted in other direct and indirect economies coming from the more efficient utilization of equipment with the accompanying saving in platform expense.

This dispatching system was laid out on a basis that would provide vigilant supervision and prompt action through immediate contact with service by men in the field. Besides endeavoring to make efficient schedules, the company has a system of control through its dispatchers and inspectors which provides forty-five men on the street during rush hours to assist in traffic regulation, proper spacing and prompt action in case of imperfections in the service. Service irregularities have been reduced to a minimum, where prompt action is possible through the speedy transmission of intelligence and dispatching of relief for such troubles as wrecks, trolley breaks and accidents. Incidentally, all emergency trucks and similar equipment carry police sirens.

The dispatching organization comprises a chief dispatcher and three assistant chief dispatchers, located at the main office, who, in three shifts, carry the work continuously through twenty-four hours, and dispatchers, inspectors, company police, motorcycle inspectors, division officials.

PRIVATE TELEPHONE SYSTEM GIVES DISPATCHER DIRECT CONTROL

The dispatching desk is connected directly with twenty-six dispatchers' booths located at strategic points over the system. In addition, the dispatcher has direct telephone communication with pole box telephones located at fifty-one intermediate points on all lines of the system. All these telephone connections with the dispatcher's desk are over private wires.

The assistant chief dispatchers keep a record of all the calls from field dispatchers, inspectors, company police, division officials, etc., listing all delays of over five minutes, all accidents and all occurrences pertinent to the operation of the system. These are tabulated and a typewritten report for each day is on the desk of the superintendent of transportation by 7 o'clock the following morning. These men also carry out the dispatching orders of the chief dispatcher, reroute cars, fill in spaces, handle emergencies, dispatch emergency tower wagons, trucks or wreck cars, police or medical aid, and act as the nucleus for transmitting orders and receiving reports for the entire system.

One of the Twenty-six Dispatchers' Booths Located at Strategic Points on the Kansas City Railways System

These booths are electric lighted and heated and equipped with telephone, schedules of all lines passing the booth, information of the city and the system, and with miscellaneous equipment such as switch bars, spare trolley poles, fuses, replacers, pick-up sticks, jacks and chains, light repair kit and fire extinguishers.

The dispatchers located at the twenty-six booths scattered over the system at strategic points are on duty eighteen hours a day. They check and correct on the street irregularities in headways and schedule distortion. They report to the chief dispatcher all delays or failures of over five minutes. They keep a typewritten record of the time of arrival and the load of every car passing the stations. They observe and report any defects noted in passing equipment to the assistant chief dispatcher, with the result that defective equipment is promptly removed from service. In addition to the duties already mentioned, these men act as public information stations, sell tokens and tickets and are in every respect branch offices of the main office for the convenience of the public.

The inspectors, dressed in a uniform which is distinctive from the trainmen's uniform, are stationed at heavy points during the rush hours. They assist in loading and moving cars and act as traffic officers when necessary. They transmit orders to trainmen, check up defective equipment, report violations of rules, assist the public in every way possible and see that cars are given preference over vehicular traffic at all intersections. These men are all commissioned police officers and they act in perfect co-operation with the police department, by which they are recognized. During the non-rush hours, the inspectors travel over the lines constantly, looking for improper operation, schedule distortion and keeping in constant touch with the chief dispatcher through the pole telephones.

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In addition to the regular inspectors, the company employs four motorcycle inspectors, working in two shifts of ten hours each. Their duties and authority are the same as those of other inspectors. They function particularly in cases of fire, accidents or other emergencies. Their motorcycles are equipped with sidecars so that they can transfer trouble men, division officials and others rapidly and can carry emergency kits. They also assist in handling parades. They are commissioned officers and wear a uniform similar to that of the motorcycle police and their cars are equipped with police sirens.

THE RAILWAY HAS A POLICE DEPARTMENT

The Kansas City Railways also has a police department which is said to be unique among street railway companies. It consists of a chief and a day and a night captain and fourteen officers. The police department is on duty twenty-four hours a day. Use is made of a fast automobile equipped with a police siren, and every man in the department is an ex-police department officer, commissioned by the city and given equal authority and rights as regulation police officers. These men answer accident calls, handle crowds, secure names of witnesses, assist in caring for the injured, keep the streets clear. Their police authority renders them invaluable in such emergency cases. They assist in clearing up parades and make arrests of traffic violators or disturbers, if necessary. In times of heavy traffic movement at parks, ball games, parades and other special events, they report to the chief dispatcher and assist in distributing the load, preserving order and in exercising general police authority. These men are also used as guards and watchmen at all points where money is handled.

In addition to the regular company police department, there are 115 police commissions in the transportation department. These were granted by the police commissioner and the railway employees so commissioned are regarded by the police department as regulation officers with power to make arrests, handle traffic and perform other duties of a similar nature.

The entire dispatching organization works in conjunction with the traffic checking department of the railway. The daily reports of car arrival time and loads kept by each dispatcher, combined with the reports of the traffic checking department, give a daily traffic check and survey of every important line. As a result, the superintendent of transportation and the general manager have on their desks each morning the loading check, car receipts, car-mile receipts and total receipts of every important line, together with the platform operating expense of each line. Thus the schedules may be and actually are adjusted daily, as occasion requires.

The results of this comprehensive dispatching system are readily apparent. The company states that in spite of hills, narrow streets and vehicular congestion, it is able to maintain high service standards with delays reduced to a minimum. Train crews are constantly checked, discipline is better enforced, and accidents and emergencies are more expeditiously handled as a result of the dispatching system.

Company Does Paving at Cost for City*

AN INTERESTING example of the way in which an electric railway company, by means of its trained organization, can be of help to a city government is shown by an incident which occurred in Colorado Springs a little more than a year ago. This city of about 40,000 inhabitants decided to put through a considerable job in paving, which the city engineer estimated would cost approximately $1,100,000. Four of the principal streets of the city were involved, and on one of these the Colorado Springs & Interurban Railway maintained a double-track railway about 3 miles in length.

The city advertised for bids, but when they were received they were found to be in excess of the engineer's estimates, except for a small proportion of the work. The specifications for the rest of the work were then changed and new bids were requested, but these also were considered unreasonably high by many of the citizens. The railway company then made the following offer to the city, to wit: If the Council would reject all the present unsatisfactory bids, the company would do the work on that part of the undertaking for $5,000 less than the lowest bid which the city had received up to that time. It agreed also in separate provisos to do the work without profit of any kind, that the cost would not exceed that already mentioned, and finally that while it would have to purchase certain equipment to do the work, this equipment would be considered a part of the cost of doing the work and be turned over by the company to the city at the expiration of the contract.

This offer was accepted, and when the contract was finally completed, which was about Nov. 1, 1922, it was found that the company had saved the city $200,000 in cash and had turned over to the city the equipment which it had purchased at a cost in excess of $96,000.

Incidentally, the company found that the work that it had to do itself in connection with its own track in this repaving undertaking had been done at a cost of some $30,000 less than the lowest bid made by any contractor, and that it had obtained a much better class of work.

Transportation Conference

A CALL for a national conference on transportation, to be held in Washington, Jan. 9, 10 and 11, was issued on Dec. 25 by Julius H. Barnes, president of the Chamber of Commerce of the United States. The discussions at this conference will relate to recent reports of committees of the national chamber on the following phases of the transportation question: (1) Governmental relations to transportation; (2) railroad consolidation; (3) readjustment of relative freight rate schedules; (4) highways and motor transport; (5) co-ordination of rail and water service; (6) taxation of common carriers. Abstracts of the committee reports, 4 and 6, which relate more closely to electric railways than any of the others, were published on pages 903 and 905 of the issue of this paper for Nov. 24, 1923.

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Washable Seat Covers Prove Popular on Interurban Line[*]

A CAUSE for complaint among patrons of the Northern Texas Traction Company, Fort Worth, with regard to the interurban cars used to be that the leather backs of the car seats in many cases soiled their clothing. To overcome this the company has equipped all the interurban cars in limited service on the Fort Worth-Dallas line with slip-on covers which extend over the seat backs for a distance of 12 in. from the top.

These covers are made of regular automobile seat covering, duck No. 2430. It requires 1 yd. 4 in. of the material at 35 cents per yard to make one cover and the labor and other costs are about 20 cents, making each one cost approximately 59 cents. The average life of a cover is several months, and during the year they have been in use only $30 has been spent for repairs, outside of the regular replacement of worn-out covers.

A contract has been made with a local laundry to wash these covers at 1 cent each and every set is washed once in fifteen days. These covers give a pleasing effect to the car interior as well as prevent dirt being rubbed off the seats onto the clothes of the passengers. Many favorable comments have come from patrons of the line, and the improvement has increased the popularity of the Fort Worth-Dallas limited service with only a very small increase in expense.

Prizes for Helpful Suggestions[*]

TWO methods of encouraging helpful suggestions from employees for the improvement of the service or more economical operation are being practiced by the Colorado Springs & Interurban Railway. One of these is to offer prizes for the best suggestions of this kind submitted by employees. An offer of this kind, with first prize of $100, second prize of $75, third prize of $50, and fourth prize of $25, was made by this company in 1923. Prizes are awarded at the end of each year by a majority vote of the board of directors. The vote of the directors is taken without knowledge as to who made the suggestions.

All suggestions must be in writing. A number have already been received and some have been adopted and put into force. The men are taking great interest in the plan.

A second method of stimulating interest in improvements in the practice of the company was begun in February, 1923, in the form of monthly luncheons for the superintendents and the foremen with the president of the company. At these luncheons the foremen read papers prepared by themselves upon the work of their respective departments, and this is followed by general discussion, either of the points brought up in the paper or of any other matters that the foremen feel may be of interest to the company. The papers are typewritten, and a copy is delivered to each of the directors of the company. It has been found that the foremen at these meetings will make suggestions for improvement of the service and economies in operation which they might otherwise hesitate to make to the superintendent for fear that such suggestions might be considered as criticisms of his management. Another benefit from the plan is that the directors of the company gain a better understanding of the details of the operation of the system through the reading of these papers than they might otherwise have.

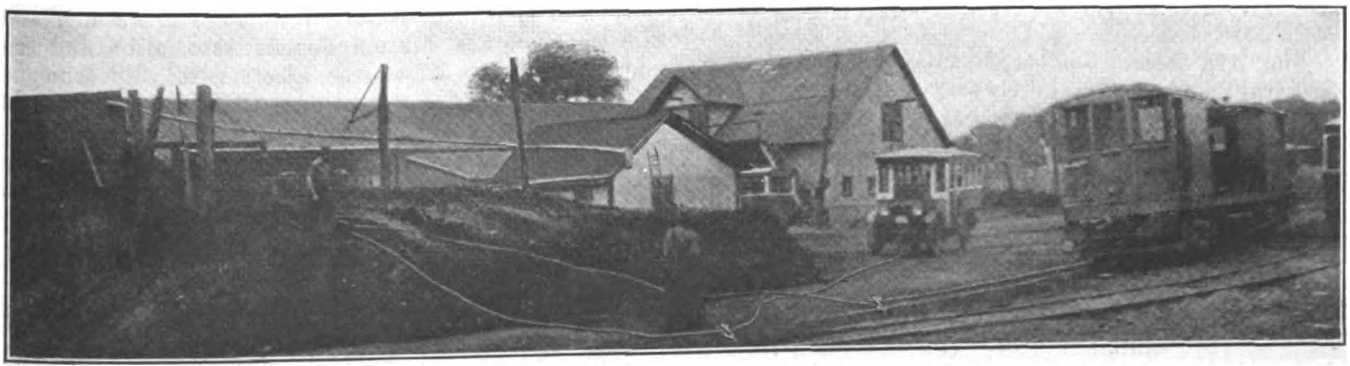
Piling Coal with Bus and Trolley

MOST people who use coal in the Eastern States, whether individuals or company officials, did what they could last summer to have a sufficient supply for this winter. Among other companies, the Connecticut Company put in a quantity of coal for power and heating purposes.

A visit in July to the Mount Vernon Street carshops in Hartford of the Connecticut Company disclosed a novel method of piling the coal purchased for heating purposes in those shops. A supply of from 600 to 700 tons was being put in outside storage, and after being discharged from the coal wagons had to be piled. This might have been done by hand or with a scoop drawn by horses, but a much more rapid and economical way was being followed with a scoop operated by a car and bus. This shovel was connected to a cable which ran over a sheave attached to a pole near the top of the coal pile and then over a sheave near the bottom of the pile. By this cable the scoop could be hauled to the top of the coal pile. Another cable attached to the scoop passed over a sheave near the bottom of the pile. This enabled the scoop to be pulled down. One of these wires was connected to a trolley car and the other to a bus.

The only operators required were one for the trolley car, one for the bus, a man at the bottom of the coal pile to fill the scoop and a man at the top of the coal pile to empty it.

The trolley car by backing would then haul the scoop to the top of the pile, and after it was emptied, the bus would haul it down again.



The Car Pulls the Shovel Loaded with Coal to the Top of the Pile and the Bus Pulls It Down

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Through Trains Out of Indianapolis

TWELVE through passenger routes are now being operated out of the Indianapolis joint terminal. The following table gives these routes, running times and number of trains daily:

Through Trains from Indianapolis to	Miles	Running Time Hours	Running Time Minutes	Trains Daily Each Way
Fort Wayne via Anderson, Muncie and Bluffton (Limited)	126	4	50	7
Fort Wayne via Anderson, Muncie and Bluffton (Hoosierland)	126	3	55	1
Fort Wayne via Kokomo, Peru and Wabash (Wabash Valley Flier)	136	4	10	1
Goshen, Ind	160	5	20	1
Louisville, Ky*	117	3	45	7
Terre Haute, Ind	72	2	25	7
Marion, Ind. (Limited—connecting at Anderson)	72	3	30	12
Marion, Ind. (Marion Flier)	72	2	40	1
Lafayette, Ind	70	2	35	7
Richmond, Ind	70	2	35	7
Muncie, Ind. (Limited)	57	2	20	16
Muncie, Ind. (Muncie Meteor)	57	1	50	1
Connersville, Ind	58	2	0	13
Greensburg, Ind	49	1	45	12
Dayton, Ohio (Way)	109	4	15	4
Dayton, Ohio (Limited)	109	3	55	3

*Also six trains connecting at Peru for Goshen.

Automobiles Flatten Traffic Curve

MANY railway managers realize that the large business which they used to do in the summer has gone to the automobile, but all perhaps have not definitely determined the extent to which their traffic has been so affected. The influence on one road, the Eastern Massachusetts Street Railway, is shown by the accompanying chart. This chart gives the traffic for each month of several years, in percentage of the average business during January, February and March of that year, for the company mentioned and for its predecessor, the Bay State Street Railway. The years whose traffic is thus charted are ten in number, selected at intervals from the past eighteen years.

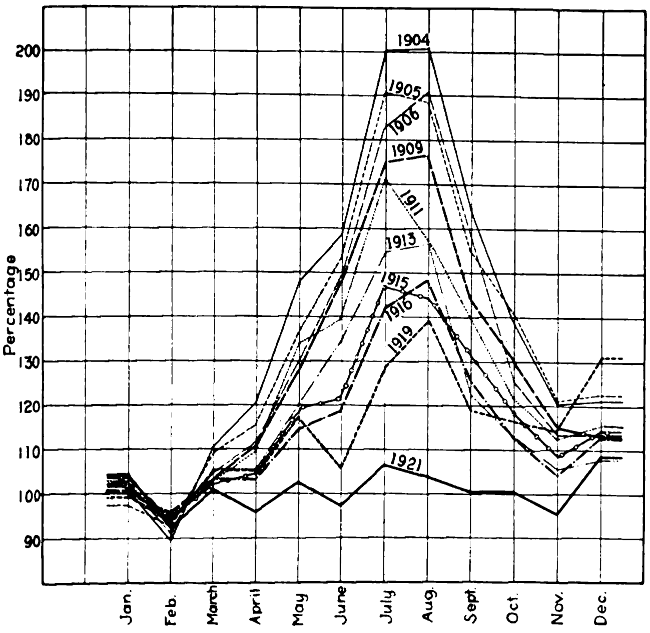


Chart Showing Seasonal Variation for a Number of Years on System of Eastern Massachusetts Street Railway

As will be seen, the chart shows a constant decrease in ratio of summer business to winter business. Curves for individual lines naturally would show some variation from the combined curve, as the Eastern Massachusetts system is made up of a number of city lines, as well as suburban lines, but the effect mentioned is shown in practically all of them to some extent. The curve is affected somewhat, of course, by the discontinuance during the past few years by the trustees of the Eastern Massachusetts Street Railway of some 200 miles of track. Probably the summer peaks on these lines has been higher than on the rest of the system.

Education in Milwaukee

Thirty-one Courses Are Offered by the Employees' Benefit Association This Year—Cost of the Work Is Borne by the Association

FOR a number of years the Employees' Mutual Benefit Association of the Milwaukee Electric Railway & Light Company has conducted classes on various topics directly or indirectly connected with electric railways and electric lighting. The courses are under the direction of Prof. H. A. Rowland, educational director of the company.

This year the bulletin announcing these courses showed thirty-one courses altogether, divided as follows:

In mathematics: arithmetic review, advanced arithmetic, shop arithmetic, algebra, trigonometry, calculus and calculating machines.

In electricity: direct and alternating current principles, electrical experiments, electric motors, transformers, rotary converters and rotary condensers, storage batteries, high-voltage problems, electrical instruments, the electrical distribution system, car electrical equipment.

In mechanical subjects: blueprint reading, sketching, lettering and curve drawing, the automobile.

In power plant courses: power plant engineering No. 1, steam engines, steam turbines, power plant engineering No. 2, power plant engineering No. 3.

General: psychology, economics of labor, English for the foreign born, English for engineers, quiz class in accounting.

Most of the lessons are held in the evening, but there are some starting at 12:30 p.m. The class period is usually one and one-half hours.

Any member of the benefit association is eligible to join the classes, but in some of the more advanced work the primary course is required. Certificates are granted to those who complete courses, but to secure a certificate a grade mark of more than 70 per cent and an attendance record of more than 80 per cent of the class periods are required. It is also expected that each student will do a certain amount of home work in addition.

Professor Rowland is assisted by thirteen instructors, almost entirely college graduates who are ambitious to help in this kind of work. All are members of the Employees' Mutual Benefit Association and are employed by the Milwaukee Electric Railway & Light Company in regular operating positions. The cost of carrying on this work is borne by the association.

The pamphlet program announcing these courses for the 1923-24 season carries a number of inspiring slogans, such as:

"Things don't turn up in this world until somebody turns them up."

"A competent employee can't be held down nor an incompetent one held up."

"The man who only half tries doesn't even make half good."

Maintenance of Equipment

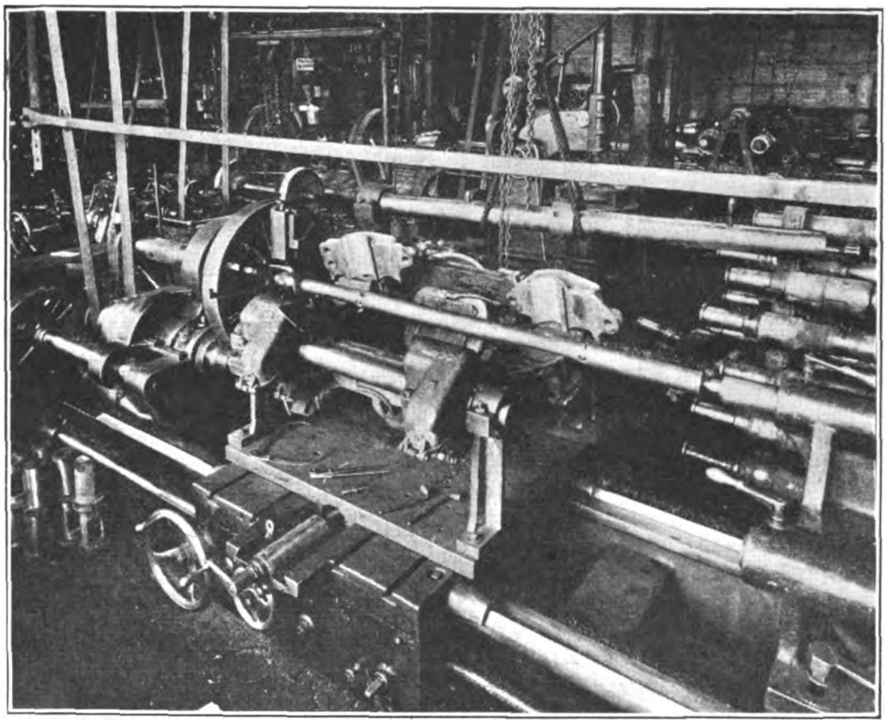
Rehabilitating Motors at Spokane*

AN EXTENSIVE system of rehabilitating motor equipment has been under way at Spokane, Wash., since the consolidation of the two street railway systems in that city. The management determined that the most essential problem was the building of the worn housing fits in motor cases, as most of the bearings required shimming to hold them. The method followed for doing this was by electric welding, an average of about ¼ in. of solid steel being placed in the housing fits.

After this building up is completed, the motor shell is set up in a McCabe 72-in. double spindle lathe. An accompanying illustration shows a G.E.-80 motor in position for machining. The plate on the carriage is part of the equipment of the McCabe lathe. The jigs for holding the axle were manufactured in the company's shops and are bolted to the carriage plate. Perfect alignment is secured by putting a piece of axle in these pillar blocks and then bolting the shell in with the bearings in position.

There are two upright bolts with running threads on the back of the plate. These go through the motor bolt holes in the cases. By using these the casing is brought up to its proper position. A sheet-iron templet is used on the pole pieces in order to obtain proper centering. When the crossfeed of the lathe is locked in proper position, proper gear mesh is assured, as the distance between the center of the axle and the armature shaft is fixed. The boring bar is provided with two high-speed cutters so that both bearing fits are bored out at once.

It requires one man about half an hour to change from the regular lathe equipment to the set-up necessary for boring out motor shells, and in addition it takes another half hour to set up the shell. The top half of the case is set up in the lathe with the bottom half of the bearing bolted to it. After the shell is in position, it requires about two and a half hours to bore a casing.



Set-Up for Reboring G.E.-80 Motor Shell

In the welding particular care is taken to provide a deposit of sufficient metal so as to be sure that a solid clean cut can be taken. About 10 lb. of steel welding rod is used per shell, which makes a total cost, not including the cost of welding current, of about $5.25. This includes the machinist's time for boring. Any additional welding or reboring of bolt holes would be an additional cost. The cost of reboring shells, reinsulating fields and putting other motor equipment in proper condition for G.E.-80 motors runs between $12 and $15 per motor. All bolt holes that show wear are filled up and rebored to standard size.

A heavy boring bar can be seen in a sling at the back of the lathe in the accompanying illustration. This bar is used for boring out Westinghouse 101-B motor shells. The company is standardizing on one size for its bearings, and so the Westinghouse 101-B housings are welded up and the large hole in the end of the case is rebored to a smaller diameter. All loose bolt holes are welded up and rebored. The cost of welding, reboring, overhauling and insulating a Westinghouse 101-B motor, other than work on armatures, is about $32. All lathes are served by jib cranes similar to the one shown in the illustration over the wheel lathe in the background.

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Aluminum Tubing Covers Iron Stanchions*

ALL of the cars of the Northern Texas Traction Company, Fort Worth, have platform stanchions of iron pipe, painted on the outside with a good grade of paint. Nevertheless, in a short time the paint wears away, especially where the passengers continually grab at the same place on the stanchion. After the paint has worn off, the bare pipe presents a dirty appearance in contrast to the painted part. Furthermore, when a woman wearing white gloves boards the car she naturally grabs the stanchion, and the gloves become soiled. This has caused

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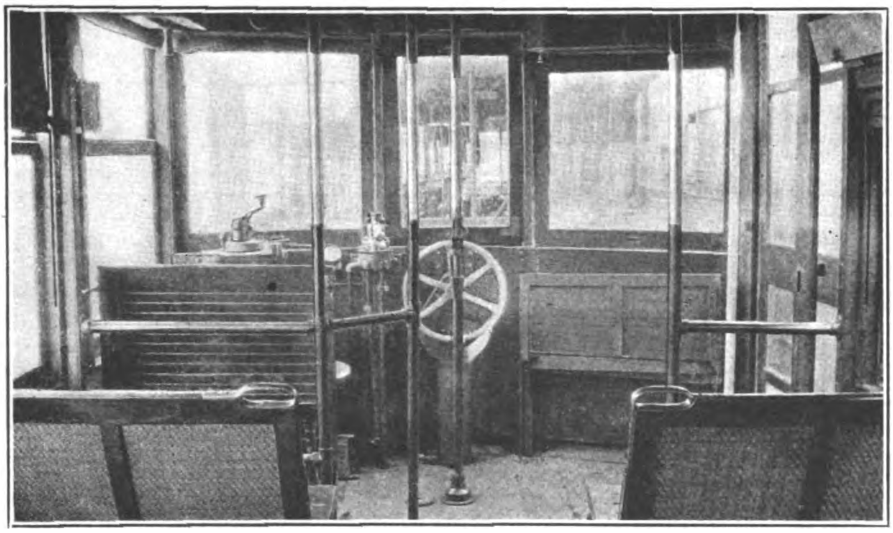


The Iron Pipe Stanchions in the Cars of the North Texas Traction Company Are Covered with Aluminum Tubing

many complaints, which, though they are trivial, the company has sought to eliminate.

Through the co-operation of the Aluminum Company of America, aluminum tubing has been secured which just slips over the outside of the pipe stanchion. Every platform stanchion which the passenger is likely to grab in boarding or leaving the car has been covered with the aluminum tubing for a distance of several inches above and below the common place of taking hold. The result is that the stanchions always present bright clean surfaces, and instead of complaints the company has been receiving a great many commendations from its patrons since the change.

Painting Cost Reduced More than Half

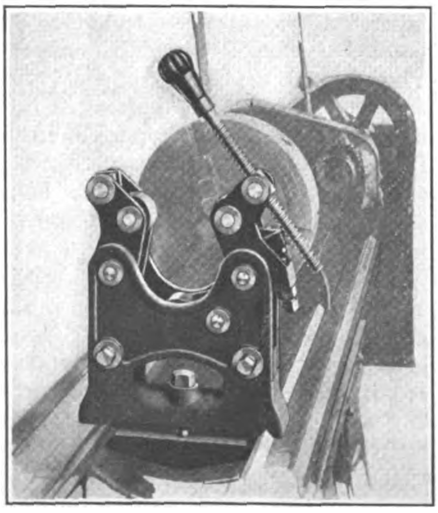
A CHANGE has been made in the painting methods used by the Spokane United Railways, Spokane, Wash. The previous practice was to scrape and remove all loose paint from the car body and then give a coat of primer, after which the surface was puttied and sanded so as to apply a second coat of primer. This was followed by two coats of flat color, a coat of rubbing varnish, and a coat of heavy car body varnish. This method of painting cost about $140 per car.

The enamel process of painting is now used. After the usual method of scraping and removing all loose paint from the car body, a coat of primer is applied. This is then glazed, puttied and sanded, and another coat of primer is put on. This is followed by very light sanding and later with two coats of Fuller's cab enamel. This process costs but $65 per car and is found to be more serviceable than the paint and varnish formerly used.

New Equipment Available

A Steady Rest with New Features

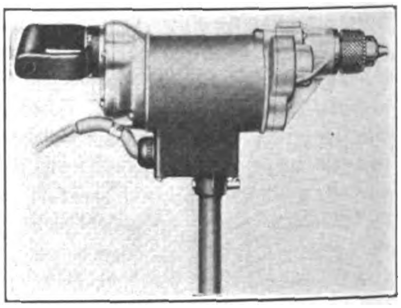
FOR machining operations such as facing, boring and turning, performed on the end of material, a steady rest has been developed by the McCrosky Tool Corporation, Meadville, Pa. The work is held between three rollers running on roller bearings. The rollers move toward the center simultaneously upon closing the jaws, the work having been inserted from the top with the jaws open. The handle end of the screw is dropped into a slot in the front jaw and the device is tightened by turning the screw. The device can be easily attached or removed from the lathe, but when once adjusted for the position of the centers on the lathe on which it is used no readjustment is required. A large range of diameters can be handled and the operator may go from the smallest to the largest diameter without any adjustment except a few turns of the tightening screw.



Machining Operations Are Simplified by Means of This Steady Rest

High-Speed Electric Drill for Small Work

A NEW model electric drill of 5/16 in. capacity and with side handle construction is being put on the market by the Hisey-Wolf Machine Company, Cincinnati, Ohio. This drill is equipped with a universal motor for operation on either alternating or direct currernt. This is a high-speed machine and is for use in either wood or metal drilling and reaming operations.



A Junction Box at Bottom Facilitates Cable Repairs

A cable junction box is provided on the frame. This is a new feature and permits cable repairs and renewals without dismantling the machine. The operating and controlling switch is conveniently located in the side grip handle.

The machine is provided with ball bearings throughout, and these, together with the gears and other moving parts in the gear end of the machine, are supplied with lubrication from the gear transmission case. The ball bearings on the top head are packed with grease. The machine is furnished with 15-ft. electrical conducting cable, fitted with a suitable attaching plug and Jacobs drill chuck for holding straight round shank drills up to 5/16 in. diameter. A grinding wheel attachment with 4½-in. x ½-in. wheel can be supplied on order.

The News of the Industry

Queens Needs Line

Committee to Consider Problem of Meeting Transit Demand of Fast Growing Section

The need for a new four-track main line subway through the "physical" center of Queens Borough was presented to the Transit Commission, on Dec. 18, by a joint committee composed of the transit committee of the Queens Chamber of Commerce and the executive committee of the new Queensboro rapid transit committee. Such a line should in the main follow the line of Queens Boulevard, the several speakers said, through Jamaica, Hollis and Queens Village to the city line.

The principal speakers on behalf of the Queens representatives were: William A. Jones, Jr., chairman of the Queensboro rapid transit committee, and Robert W. Higbie, chairman of the Queens Chamber of Commerce rapid transit committee.

OTHER EXTENSIONS NEEDED

Chairman McAneny told the visitors that along with construction work now under way must go the new crosstown line and the Washington Heights extension, and after that, if an agreement were reached between the city and the Brooklyn-Manhattan Transit Company, must come the subway extension of the Fourteenth Street-Eastern line, which the company has agreed to operate, if the city constructs. Chairman McAneny said:

> Then there must come the matter of a new entrance to Brooklyn, perhaps via Livingston Street, and also the matter of the solution of the problem in Forty-second Street, Manhattan.
>
> Beyond that program we all feel, I think, that there must come a new entrance to Queens. There are no doubt several lines required in Queens; just what order they are to come in is, of course, something that must be determined. Queens is well up to the front in the new program and it would be well, I think, to fix the sequence which the several projects for Queens shall take.

RECOMMENDS CONFERENCE

He suggested that the two Queens committees name a committee of engineers to confer with the commission's engineers and experts. This, it was stated, had already been done. The Queens engineering committee is headed by John C. Brackenridge, a well known engineer.

Mr. Higbie stated that whatever form the relief for Queens should take, any new line should be a through one, direct to lower Manhattan. He suggested that Sixth or Eight Avenue, Manhattan, be reserved for a route for a Queens line.

Chairman McAneny pointed out that it would be folly, with the limited number of north and south thoroughfares that there are in Manhattan, to reserve one exclusively for a Queens line, but explained that in the new subway plans provision is made at some points for six and eight tracks, which will provide entrance capacity for Queens and other lines.

In reply to a question of Mr. Higbie as to whether a spur of the Fourteenth Street-Eastern line might not be built to tap Ridgewood, Commissioner Harkness said that the decision to construct the eastern end of the line as a subway opened for discussion the possibility of whether that line might not be routed through Ridgewood.

Los Angeles to Ask Commission to Fix Viaduct Share Cost

The city and county governments of Los Angeles have decided to ask the California State Railroad Commission in the form of an application to establish the equitable rate for the total of the cost of six viaducts to be constructed over the Los Angeles River to be paid by each of the interested and benefited parties. It is proposed that each of the interested parties would pay an equal share of the cost, although the pro rata for each viaduct would be different. For instance, the Los Angeles Railway lines would not use the Aliso Street viaduct and probably would not use the Ninth Street viaduct for years to come. Therefore, it is to be determined whether the Los Angeles Railway would be relieved of a share of the cost of the two proposed structures. The cost of the track relocation work is estimated to be $1,200,000.

The Los Angeles voters on June 5 approved the $2,000,000 bond issue as its share of the expense of constructing these six viaducts over the Los Angeles River to separate the grade of steam road lines operating on the east and west banks of the river and car lines and highway traffic. This improvement was proposed with a view to relieving traffic congestion and extreme traffic delays to riders delayed from fifteen to fifty minutes daily by operations of steam road trains at points of crossing at Los Angeles River bridges.

The City Engineer of Los Angeles estimates the total cost of six viaducts, including the expense of relocating the railroad tracks on both sides of the river, would be between $5,000,000 and $8,000,000, and that each of the interested parties, namely, the city of Los Angeles, county of Los Angeles, Santa Fé Lines, Union Pacific System, Los Angeles Railway Corporation and Pacific Electric Lines are to bear their proportionate expense.

Jitneys Meet Doom

Alabama Supreme Court Hands Down Decision Making Taxicab Operators Liable to Arrest

The City Commissioners of Birmingham, Ala. have won what is believed to be a final victory against the jitneys, in a decision handed down by the Alabama Supreme Court Dec. 22.

For the past few weeks the Birmingham Interurban Taxicab Service Corporation has been operating jitneys under an injunction against the city. The decision of the Supreme Court dissolves this injunction, thus making the operators of automobiles of this company subject to arrest by Birmingham officers.

Some time ago the city of Birmingham enacted an ordinance against jitneys operating within four blocks of a street car line in the downtown section of the city and placing an annual license tax on each jitney of $100. The jitney men asked for an election by the people on this ordinance. The election was granted and the jitneys were defeated.

LICENSES REFUSED

Then the Birmingham Interurban Taxicab Service Corporation was organized by former jitney owners and it applied to the city for taxicab licenses. The cars of this company were inspected by W. B. Cloe, Commissioner of Public Safety, who reported the automobiles unsafe and otherwise unsatisfactory for taxicabs. On the strength of this report licenses were refused. The taxicab company then applied to Judge Roger W. Snyder of the Circuit Court, who granted a temporary injunction. On motion of the city, Judge William M. Walker dissolved this injunction two days after it was granted. Then the taxicab company applied for a reinstatement of the injunction and this was denied. The taxicab people then applied to Judge B. M. Miller of the Supreme Court, who reinstated the injunction pending the appeal to the Supreme Court.

Now the Supreme Court affirms the decree of Judge Walker, which dissolves the injunction and leaves the operators of these so-called taxicabs liable to arrest by the city for doing business without a license.

Another case, in favor of the city and against the Boyles Transit Company, was decided by the Supreme Court also on Dec. 22. In this case the transit company was operating automobile buses to Boyles and Tarrant City. This company asked an injunction against the city from requiring it to give bond for operating these buses. Some time ago an ordinance was adopted by the city which was in the nature of an agreement between the city and the Birmingham Railway, Light & Power Company, requiring that interurban buses operating through sections served by street cars be required to give bond. An injunction against the city in favor of the transit company was granted in the Chancery Court. The city appealed to the Supreme Court, and the Supreme Court upheld the city settlement ordinance.

The automobiles operated by the Birmingham Interurban Taxicab Service Corporation all carried the sign "Taxicab for Hire." But they picked up passengers along the streets wherever they could get them, charged a fare of 10 cents, and operated only on certain streets. Thus in reality they were the old jitney, only under the name of "Taxicab."

City officials say, now that the Supreme Court has ruled on these two cases, they will put the law into effect immediately. Thus the jitney in Birmingham seems to have met its doom at last, after more than a year of fighting their battles in the courts and at the polls.

Plan to Raze New York Elevated Approved by City

The Board of Estimate of New York City has ratified the action of its committee of the whole in approving the plan of Borough President Julius Miller of Manhattan to raze the Sixth Avenue elevated railroad structure from Trinity Place to Fifty-third Street and Sixth Avenue and to build a subway to take its place.

Two resolutions presented by Mr. Miller have been adopted formally. One of these directed Corporation Counsel George P. Nicholson to draft a bill for introduction in the Legislature to permit the city to acquire the elevated structure. The other resolution called for a conference with the Transit Commission in regard to plans for the subway.

City Desires Staten Island Lines Despite Promises to Improve

According to John A. Lynch, president of the Borough of Richmond, New York City, electrification of approximately 30 miles of steam railroad in Staten Island has been practically promised to Acting Mayor Murray Hulbert and other members of the Board of Estimate by President Willard of the Baltimore & Ohio Railroad, operating the Staten Island Rapid Transit Railway.

Despite this it is expected that plans will be pushed for the city to buy, electrify and operate the Staten Island lines.

Mr. Lynch, said that Mr. Willard had assured city officials that the railroad also would extend its lines from Arlington to Tottenville, a distance of about 8 miles, and build spurs to industrial plants.

If the city electrified and operated the steam railroads, Mr. Lynch said, a reduced fare would result. He pointed out that on the line from St. George to Arlington, and from St. George to South Beach, a distance of about 9 miles, an 8-cent fare was charged, while on the main line from St. George to Tottenville, a distance of 15 miles, the round trip fare was 79 cents for ordinary passengers and 22 cents for commuters. He said it would be possible for the city to operate the lines on the basis of a 10,-cent fare. He estimated that $10,000,000 would be the cost of electrification, ventured no estimate of what it would cost to purchase the railroad lines.

He added that he had already requested the Corporation Counsel to prepare an enabling bill for the acquisition of the lines on Staten Island, to be presented early in the next Legislature.

Railway Matters Before Council

Toledo Fares May Go Up—Jitney, Trolley Bus and Maintenance Allowance Metters Present Problems

An increase in fares at Toledo is expected to be announced as a result of deficits which have brought the stabilizing fund of the Community Traction Company, to the low level of $56,868 as of Dec. 1. The raise would be to straight 7-cent fare from 7 cents cash with six tickets for 40 cents.

The deficit for operations in the month of November as reported to the street railway board of control was $9,997 and for the month of October it was $19,256.

Although a surplus will probably be earned in December Commissioner Cann is doubtful about keeping fares at their present level. It will be up to the company to move to change the fare. Some time ago the stabilizing fund fell below $300,000, but the railway officials on advice of Street Railway Commissioner Cann, postponed action. The stabilizing fund was growing monthly until a raise in wages in the spring brought about a return to red figures.

After the first of the New Year a new City Council with members considered to be especially favorable to traction development in accord with the Milner settlement plan will be at the helm in city affairs. In consequence some important developments are expected. Recommendations have already been made looking to the elimination of buses which compete with the railway. There is also strong possibility of the establishment of a trolley bus crosstown line. Equipment of this type has been investigated by the commissioner and some members of Council and all appear to be favorable to the trolley-bus plan. One-man operation may also be resumed as a means of reducing expenses. Furthermore there may be some changes in the allowances for maintenance for 1924 and a revision of power rates.

In November the gross revenue of the railway was $323,510, an increase of $17,325 over the same month a year ago. Operating expenses in November, 1923, were, however, $21,286 greater than for the similar month in 1922 due to higher maintenance charges and increased wages.

The first eighteen days of December showed an increase in revenue of $9,548 over the similar period last December.

For the year soon to end the $640,000 set up for maintenance was overspent by $15,000.

International Wins Suit Against Customs Collector

United States District Judge John R. Hazel in Buffalo has handed down a decision making permanent the temporary injunction granted some time ago in the case of the International Railway, Buffalo, against the United States customs collector at Buffalo, who has supervision over the Niagara Falls and Lewiston bridges of the International between the United States and Canada. The United States customs department threatened to close the two bridges to all traffic Sundays and holidays unless the traction company guaranteed the payment of overtime wages to the United States customs inspectors assigned to duty on these bridges across the Niagara River at the International boundary line.

It was the contention of the International Railway that it is the duty of the United States Treasury Department to pay the inspectors for overtime work. The order of the customs department would force all incoming passengers from Canada via the International Railway to deposit their hand baggage and packages at the customs offices and claim them the day after Sunday or holidays. The International Railway claimed that this would mean the virtual closing of the bridges and would cripple their business with tourists on the busiest days of the year.

A temporary injunction was handed down by Federal Judge Hazel restraining the customs collector at Buffalo from putting the proposed regulations into effect. Further arguments were heard by the court and now the temporary writ has been made permanent.

Increase in Wages for Findlay Employees

Employees of the Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio, on January 1 will receive a flat increase of 3 cents an hour in wages. This was provided in a recent pact between employees and the company which gave the men in freight service an increase of 6 cents an hour and those in passenger service a boost of 4 cents an hour from Aug. 16 to Jan. 1, 1924.

The rates provided 47 cents an hour for the first three months service, 49½ cents for the next nine months and 53 cents thereafter in the passenger service. Freight men have a scale of 49, 51½ and 55 cents for like periods of service. The new increases will be added to these amounts.

News Notes

Will Represent in Legislative Work.—Henry W. Killeen, attorney for the International Railway, Buffalo, has resigned from the law firm of Penney, Killeen & Nye effective Jan. 1, 1924, to become head of a new law firm to be known as Killeen, Sweeney & Kelley. Mr. Killeen will represent the International in legislative work in Albany. Thomas Penny and Judge Nye will continue to represent the International in the trial of negligence cases and many of the smaller cases will be given to other attorneys for trial in the courts.

Men Get Safety Bonus.—One half the amount estimated saved in avoiding accidents during the past three months, aggregating $4,381, has been voted as a bonus to the employees of the Memphis Street Railway. The money represents an increase of $1.76 an hour for each man.

Important Questions Answered.—"The Inside Track," published by the Market Street Railway, San Francisco, devotes a page each month to the solution of perplexing problems that may come up in the course of the day's work. The December issue contains the question: What are the three most important factors which a motorman should consider when operating an electric car? The answers given, arranged in the order of their importance, were: (1) Safety. (2) Comfort of passengers. (3) Maintenance of schedules.

Railway Research Work Encouraged.—To encourage research study in the electric railway field among university students, the executive committee of the Wisconsin Utilities Association authorized an arrangement whereby a fellowship will be granted at the University of Wisconsin in electric railway research work. Under this plan the association pays $500 each year to a senior student in engineering to work on some problem which will be selected by Professor Rood and representatives of the association, and the results presented at railway section meetings.

Extension of Time Allowed.—The local transportation committee of the City Council of Chicago has granted the Chicago, North Shore & Milwaukee Railroad a delay of three more weeks before acting upon the opinion recently delivered to the Council by the corporation counsel holding that the railroad is operating passenger, merchandise dispatch, express and freight service over the elevated lines in the city without legal rights. This matter was referred to at length in the ELECTRIC RAILWAY JOURNAL of Dec. 8, page 985.

Shows Utility Development Through Cinema.—During the 1923 State Fair the Oklahoma Utilities Association, gave a free cinema entertainment in the Liberal Arts Building in Oklahoma City. About 10,000 people saw the production, receiving information on the development of the public utility field in recent years. Among the most popular films were the "Go-Getter," illustrating the benefits of electrically operated labor-saving devices on the farm, and "King of the Rails," showing the history of transportation from the beginning of human relations down to the electrically operated transcontinental railroad.

Seeks Ordinance.—A resolution has been adopted by the Milwaukee Public Safety Commission, urging the Common Council to pass an ordinance requiring buses to stop for passengers at street car safety zones where such safety zones have been designated.

Tests to Solve Engineering Problems.—Power company officials from many points along the Mississippi River will be greatly aided in solving their engineering problems by the results of tests being made by University of Iowa engineers, in co-operation with the Mississippi River Power Company at Keokuk. When completed, the tests will reveal the exact flow of the stream and show its course and flow as far back as 1874. The tests are in charge of Prof. Floyd A. Nagler, director of the university's hydraulic laboratory, and Alrion Davis, hydraulic engineer of the Keokuk company.

Discusses Future of Railroads.—F. H. Hardin, chief engineer of motive power and rolling stock of the New York Central Railroad, in expressing his views recently in an interview in the New York *Times* on the future of the railroads said that the complete electrification of all railroads seemed to lie in the distant future. It was his belief that under present conditions electric power was costly, but that the cost might be cut by the conversion of water power into electricity on a large scale. Following the electrification of railroads in the neighborhood of big cities, these units will gradually be extended until they unite in a general system. He looked to the time when trains would be controlled by automatic devices eliminating the human element. He said that radio promised to play an important part in railroading in the future. It might be used to keep the ends of long freight trains in touch with each other, thus increasing the efficiency of the service.

Foreign News

Sanitation in Turkey

The thick red curtains in the street cars of Constantinople, which have separated the seats occupied by Moslem women from the rest of the car, will be removed, according to the plans of the authorities. This is on the ground that the curtains are carriers of disease. Instead, the two front rows of seats in the car will be reserved for Moslem women. However, a Moslem woman traveling with her husband may sit elsewhere "provided she does not contravene the civil or religious laws."

Bids for Swedish Locomotives Rejected

The Swedish State Railways at Stockholm has rejected all bids for electric locomotives for the line from Stockholm to Göteborg, the electrification of which is under way. Seven Swedish firms and six foreign firms submitted offers. The rejection was partly on account of too high prices and partly on account of inconvenient delivery terms. The cheapest offer was submitted by the Allgemeine Elektricitäts Gesellschaft of Berlin and the Siemens-Schuckert concern, their price being 195,000 Swedish crowns per locomotive. New bids have been asked for.

Address of Union Internationale Tramways Changed.—The headquarters of the Union Internationale Tramways, de Chemins de Fer d'Interêt Local et de Transports Publics Automobiles has been moved in Brussels, Belgium, from 23 rue d'Arlon, to 15 Avenue de la Toison d'Or.

British Cars for Calcutta.—The English Electric Company, Ltd., Preston, England, is constructing sixty cars for the Calcutta Tramways. This accompanies a scheme of track extension.

American Rails for Glasgow.—A contract for tramway track special work amounting to £8,568 for the Glasgow, Scotland, tramways has been awarded to the United States Steel Products Company by the tramways committee of Glasgow Corporation. This was preferred to the lowest English tender of £9,794.

Street Congestion in Glasgow.—Traffic congestion in the streets still occupies the attention of the Town Council of Glasgow, Scotland. James Dalrymple, general manager of the tramways, in a report on the subject, regards tube or elevated railways impracticable. He recommends the erection of a bridge over the River Clyde at Oswald Street and another one across the river opposite St. Enoch Square.

Turbo-Generator for London Tramways.—London County Council has accepted a tender by Richardson, Westgarth & Company, Newcastle, at £77,467 for the supply of a turbo-alternator of 15,000 kw. capacity for the Greenwich tramway power station. The set will consist of a two-cylinder turbine and condensing plant, with a Parsons alternator. The lowest tender received was £55,769, from a Swiss firm. The reason for adopting the British tender was the low steam consumption.

Financial and Corporate

Key Route Plan Approved

California Commission Sanctions Cut of $20,000,000 in San Francisco-Oakland Capitalization

The proposed reorganization of the San Francisco-Oakland Terminal Railways, known as the Key Route properties, held under foreclosure and sale in the hands of John S. Drum, Warren Olney, W. I. Brobeck and Hugh Goodfellow, and their associates, with a newly written total capitalization of $28,277,500, has been authorized by the State Railroad Commission. The old capitalization was $48,879,000.

The commission recognizes the unassailable validity of the foreclosure sale, and gives no force to the contentions of the holders of $15,000,000 common stock as presented by Attorney Joseph E. Bien. It leaves open all questions of appraisal for rate-making purposes, and does not rule against the contentions of City Attorney Gray of Oakland in that matter.

The Key Route Transit Company, with a capitalization of $17,750,000 under the approved reorganization, will have complete financial and operative control. Three subsidiary companies receive recognition. These are: Key Route Securities Company, capital stock $2,600,000; East Oakland Railway, capital stock $250,000, and Oakland & Hayward Railway, capital stock $250,000.

As indicated in an article dealing with the proposed plan in the issue of the ELECTRIC RAILWAY JOURNAL for Sept. 15, page 424, the actual capital is distributed as follows: First mortgage bonds, $2,500,000; refunding bonds, $9,416,000; preferred stock, $12,829,000; common stock (issued pro rata to holders of preferred), $3,262,500; common stock to holders of "Dividend Note," $250,000; East Oakland Railway, $10,000, and Oakland & Hayward Railway, $10,000.

The commission ruled that all the reorganization expenses reaching back for a period of many months and totaling $500,000 must be paid out of earned moneys available for interest charges and for dividends, and must not be made a capital charge which (through fixing of rates, etc.) would rest ultimately upon the public.

The commission set forth as its principal reason for approval of the reorganization plan the "fact of necessity" and the state of finances of the old company, which had at the beginning of this year no funds with which to meet these four large obligations: Matured notes, $3,200,000; funded debt due, $1,357,000; matured interest $2,706,585 and sinking fund installments due, $2,919,000.

The decision in the Key Route case, brings to a successful culmination the efforts of the past ten years to reorganize and restore these properties to financial stability. It sustains and upholds in every particular the plan of reorganization.

The company defaulted in its bond interest as long ago as 1913. These defaults were occasioned by the overexpansion of its transportation facilities subsequent to the fire of 1906 and the high cost of labor and materials. Spasmodic and unsuccessful efforts have previously been made to rehabilitate the company, but it was not until 1919—when the present committee entered on its duties, that real and substantial progress was made. This committee was finally able this year to bring all the interests into harmony and perfect a plan.

The intricacy of the readjustment negotiations is indicated by the fact that it was necessary to satisfy fifteen sets of security holders, each with a different interest to serve, with conflicting rights and with total investments in excess of $20,000,000. By compromise and readjustment, the fifteen groups were brought to subscribe to the plan with practical unanimity.

At the last moment, however, when the plan was presented, as the law requires, to the Railroad Commission for its approval, a small stockholding interest attempted to block the carrying into effect of the plan. The ruling of the commission sustains completely the work of the reorganization committee.

This plan was the result of the labors of a committee, of which John S. Drum is chairman, and with whom is associated Herbert Fleishhacker, P. E. Bowles, W. W. Garthwaite, Benjamin H. Dibblee, Gavin McNab, A. Crawford Greene, Paul A. Sinsheimer, J. F. Carlston and George Tourney as members. They were assisted by sub-committees representing particular bond issues, of which advisory committees the chairmen were Warren Olney, Jr., L. A. Redman, Robert G. Hooker and Grayson Dutton.

Potomac Merger Approved

The proposed merger of the Potomac Public Service Company with the Potomac Edison Company, Frederick, Md., has been approved by the board of directors of the former company. As was announced previously in the ELECTRIC RAILWAY JOURNAL, this consolidation was expected.

According to indications Emory L. Coblentz, Frederick, former president of the Potomac Public Service Company, successor to the Hagerstown & Frederick Railway, who is now chairman of the board of directors of the former company, will hold the same position in the merged companies. M. F. Riley, president of the Potomac Public Service Company, will be made president of the merged companies, it is understood, and Charles Harris, Henry Holzapfel and Walter S. Finlay, Jr., will be vice-presidents. The other officers, it is said, will be: Raymond E. Town, treasurer; Byron A. Winebrenner and Phillip L. Roth, assistant treasurers; Charles C. Waters, secretary, and Raymond E. Town and William K. Dunbar, assistant secretaries.

The capitalization of the combined companies will approximate $22,000,000, according to Mr. Coblentz.

Columbus Case to Be Appealed

United States Supreme Court to Be Asked to Pass Upon Decision in Stockholder Suit

E. W. Clark & Company, Philadelphia, plans to appeal to the United States Supreme Court from the decision of the Ohio Supreme Court, rendered on Dec. 11, in which the Ohio court refused to hear the appeal of the Clark interests in the case of the Columbus Railway, Power & Light Company against the Clarks as former managers of the utility. It is understood that if the Ohio Supreme Court had consented to consider the appeal for a rehearing the Clarks would have insisted that there was unjust discrimination against them and in favor of local men, and that this denied the Clarks equal protection of the laws. It is on this ground that they now propose to take the case to the United States Supreme Court.

The litigation had its inception in a suit commenced by a stockholder against the directors of the company, including C. M. Clark. E. W. Clark & Company was also joined as defendant. All the defendants were charged jointly with liability upon the several claims presented on behalf of the company, but the Ohio courts released all of the other defendants, residents of Ohio, and held the Clarks alone liable, thus discriminating, the Clarks believe, in favor of local defendants and against nonresident defendants. The contention of the Clarks is that the judgment against them is about five times as large as the amount they received from the company for services rendered to it, and that these services fully justified the payments received.

The position of the Clarks throughout the litigation has been that in their relations with the Columbus company they never took any step that was not fully authorized by the board of directors, most of whom were local people with large holdings of stock and in no way affiliated with the Clarks, and that if there was anything wrong in any action or omission in connection with the business of the company, the responsibility rested upon the directors and not upon the Clarks. The Clarks also maintain that if they are liable the directors are equally, if not primarily, liable.

Dividends Paid in Stock

Earnings on Common of New Orleans Company to Be Put Back Into Additions to Property

A dividend of 8 per cent on the $8,100,000 of common stock of the Public Service, Inc., New Orleans, for the year ended Sept. 30, 1923, has been declared by the directors of the corporation. This sum, amounting to $648,000, will be returned to the company's treasury and the stockholders of the corporation will be given paid in stock in lieu of cash. With the issuance of the dividends in the form of stock, the common stock of the corporation will be increased to $8,748,000, to be further increased next year, should the company continue to prosper, and a similar dividend be declared hereafter.

According to the agreement reached between the city of New Orleans and the Public Service, Inc., the issuance of paid in common stock must continue for a period of five years before the holders of common stock in the company will be paid cash dividends. They will then, under this plan of procedure, have increased their stock holdings approximately 40 per cent.

In making announcement of the dividend on the common stock, R. S. Hecht, chairman of the board, said:

> While the company did not earn its full 7½ per cent return on the rate base to which it is entitled under the settlement ordinance, it did earn a substantial margin over and above the amount required for this dividend. However, the stockholders will not receive the dividend in cash, because under the agreement with the city they are compelled immediately to reinvest the whole amount in the purchase of common stock of the company at par, and the same course must be followed in future years until dividends aggregating 40 per cent have thus been put back into the property.
>
> The board of directors also authorized the increase of the common stock in an amount equivalent to the dividend, so that, as a matter of fact, not a dollar of capital is taken out of the assets of the company by the declaration of the dividend.
>
> The company is in a healthy financial condition, but it emerged from the reorganization with a somewhat unbalanced set-up in that it has a total bonded debt of $42,000,000, whereas the total amount of preferred and common stock outstanding is only $12,000,000, which has always been considered by investment bankers as too small a margin behind the bonds.
>
> The directors believe the present and prospective heavy requirements for new capital can ultimately be met only through the sale from time to time of substantially large amounts of common stock which, by furnishing a proper margin of safety, will in turn permit the sale of additional bonds on a more advantageous basis. As the law of Louisiana requires stock to be sold at par, and as the common stock of the company is and has been selling considerably below par, this program prevents certain practical difficulties, for which, however, it is hoped that some solution can be found in the near future.

The budget and financial program of the company for 1924 have not yet been determined. The board of directors will decide at its January meeting the method which must be adopted to raise the large additional capital required for improvements and extensions in the coming year.

Brooklyn Surface Lines Out of Receivership

At midnight on Dec. 21 the property of the Brooklyn, Queens County & Suburban Railroad passed out of the control of Lindley M. Garrison as receiver and into the control of the company. A decree ordering the transfer was signed a few hours before by Federal Judge Mayer. The company operates surface lines on Reid, Sumner, Metropolitan and Utica Avenues, and on Broadway along with what is known as the Broadway Ferry shuttle.

The lifting of this company out of receivership leaves only two, the Brooklyn Heights and the Coney Island & Brooklyn Railroad Companies still in receivership, but it is expected that they will soon be returned to their owners.

Under the reorganization plan the stockholders of the company are expected to contribute toward meeting the company's liabilities in case the income is not sufficient to meet all of the needs. The receiver has on hand $700,000 in cash and securities, but most of this will be needed by the company as working capital.

The liabilities on July 1 last consisted of defaulted interest on bonds held by the public, claims of unsecured creditors and tort claims, totaling $1,045,497, exclusive of $400,000 of defaulted interest on the $2,000,000 principal amount of first mortgage bonds.

Abandonment Modified

Reasons Stated for Putting Off the Shutting Down of Service on Ohio Line

The Public Utilities Commission of Ohio has issued a modified order authorizing the discontinuance of service and abandonment of facilities by the West End Traction Company, a subsidiary of the Pennsylvania-Ohio Electric Company, Youngstown, at midnight on Feb. 1.

The original order of the commission issued on Dec. 14 had set midnight, Jan. 1, for the end of service on approximately 24 miles of track connecting Youngstown with Girard, Niles, Warren, Mineral Ridge and Leavittsburg, all in Trumbull County, Ohio, west of Youngstown.

The delay in the abandonment was granted by the commission upon petition of the city solicitors of Warren, Niles and Girard and the Trumbull County Commission. The petition followed a meeting of representatives of the governing bodies and civic associations of the committees affected called by the county commissioners when the original order of the Utilities Commission made it plain that street railway and interurban service would cease with the New Year.

The petition asking for delay recited that "the general welfare of the citizens" and "the future growth" of the municipalities would be affected seriously by the abandonment; that "the political subdivisions located along the lines of said railway are now negotiating in good faith and are desirous of continuing to negotiate toward a fare adjustment on the lines affected that will enable the company to continue the operation of its lines."

The company consented to the modification of the abandonment order upon the understanding that earnest efforts would be made by the communities so to adjust fares as to enable it to earn revenues sufficient at least to pay operating costs and taxes.

The crisis on the lines came on Oct. 6 when the application for abandonment was filed by the company. For

	Latest	Month Ago	Year Ago	Since War	
				High	Low
Street Railway Fares* 1913 = 4.84	Dec. 1923 **6.89**	Nov. 1923 **6.95**	Dec. 1922 **6.96**	May 1921 **7.24**	May 1923 **6.88**
Street Railway Materials* 1913 = 100	Nov. 1923 **158**	Oct. 1923 **161**	Nov. 1922 **174**	Sept. 1920 **247**	Sept. 1921 **156**
Street Railway Wages* 1913 = 100	Dec. 1923 **218**	Nov. 1923 **218**	Dec. 1922 **208**	Sept. 1920 **232**	Apr. 1923 **207**
Steel—Unfilled Orders (Million Tons) 1913 = 5.91	Nov. 30 1923 **4.37**	Oct. 31 1923 **4.67**	Nov. 30 1922 **6.84**	July 31 1920 **11.12**	Feb. 28 1922 **4.14**
U.S. Bank Clearings Outside N. Y. City (Billions)	Nov. 1923 **15.30**	Oct. 1923 **16.18**	Nov. 1922 **14.35**	Mar. 1920 **18.54**	Feb. 1922 **10.65**
Business Failures **Number** **Liabilities (millions)**	Nov. 1923 **1,644** **67.54**	Oct. 1923 **1,584** **74.43**	Nov. 1922 **1,761** **54.23**	Jan. 1922 **2.722** **105.7**	Sept. 1923 **1,280** **27.50**

Conspectus of Indexes for Dec., 1923

Compiled for Publication in this Paper by Albert S. Richey
Electric Railway Engineer
Worcester, Mass.

	Latest	Month Ago	Year Ago	Since War	
				High	Low
Eng. News-Record Construction costs 1913 = 100	Dec. 1923 **217.3**	Nov. 1923 **220.9**	Dec. 1922 **192.6**	June 1920 **273.8**	Mar. 1922 **182.0**
U.S. Bur. Lab. Stat. Wholesale Commodities 1913 = 100	Nov. 1923 **152**	Oct. 1923 **153**	Nov. 1922 **156**	May 1920 **247**	Jan. 1922 **138**
Bradstreet's Wholesale Commodities 1913 = 9.21	Dec. 1 1923 **13.44**	Nov. 1 1923 **13.14**	Dec. 1 1922 **13.78**	Feb. 1 1920 **20.87**	June 1 1921 **10.62**
Dun's—Wholesale Commodities 1913 = 120.9	Dec. 1 1923 **190.9**	Nov. 1 1923 **191.8**	Dec. 1 1922 **185.5**	May 1 1920 **263.3**	July 1 1921 **150.8**
U.S. Bur. Lab. Stat. Retail food 1913 = 100	Nov. 1923 **151**	Oct. 1923 **150**	Nov. 1922 **145**	June 1920 **219**	Mar. 1922 **139**
Nat. Ind. Conf. Bd. Cost of living 1914 = 100	Nov. 1923 **165.3**	Oct. 1923 **164.1**	Nov. 1922 **158.4**	July 1920 **204.5**	Aug. 1922 **154.5**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population.

Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen and conductors on 105 street and interurban railways in the United States, operating more than 100 passenger cars each, and weighted according to number of cars.

some months prior the company had endeavored to secure a fare adjustment, but the definite refusal of the city of Niles to entertain any such remedy for the company's losses in the last four years brought about a situation where the company had no recourse excepting abandonment.

Following the order for abandonment, however, manufacturing and commercial interests of Niles were aroused. At the meeting of representatives of the various communities it was declared that Niles would join the other cities in seeking an arrangement whereby the operation of the lines could be continued. With this declaration the company consented to a month's delay. The negotiations will be conducted by the new city administrations taking office Jan. 1 in all the affected communities.

The present rates of fare are 10 cents cash for zones of approximately 5 miles; fourteen tickets for $1 and 5 cents cash within municipal limits. The rate of fare suggested to permit the lines to continue are 15 cents cash for existing interurban zones; ten tickets for $1; 10 cents cash within municipal limits, with eight tickets for 50 cents.

Commission Approves Sale of Point Pleasant Company

The Board of Public Utility Commissioners of New Jersey has granted the application of the Point Pleasant Traction Company, Point Pleasant, N. J., to sell its property and surrender its franchise. The concern formerly operated a street railway in the boroughs of Point Pleasant and Bay Head, N. J., but it was discontinued in 1919. The company has taken up all its rails and has abandoned its service. The company asked the commission for permission to sell its real estate situated in the two boroughs and also for permission to dispose of all other assets and retire from business and surrender its charter, all of which it has the consent of its shareholders to do. The board found that there was no demand for the operation of the electric railway in and between the two towns to warrant the retention by the company of franchises.

Payment of Kansas City Claims Being Arranged

Kansas City, Mo., will receive $82,207 from the Kansas City Railways as a back payment for street cleaning and in car license taxes on the intercity viaduct. This is the result of an order from Judge Kimbrough Stone of the Federal Court.

J. C. Petherbridge, assistant city counselor, made the application and argued in favor of payment of the claims. Attorneys for the receivers, bondholders, damage suit claimants and for the company discussed the application in Judge Stone's chambers of the Federal building on Dec. 3.

Another application granted was for the payment of about $3,000 to holders of special deferred security certificates issued at the time of the old reorganization of the company in connection with damage suits then pending. A month ago the court ordered about $120,000 of the certificates to be paid. Payment will be made on the basis of 80 per cent of the principal and 80 per cent of the interest.

Mr. Petherbridge said the city was badly in need of money and that the payments would be used in defraying the expenses of the city hospitals.

Note Maturity a Problem

New Haven Railroad Seeks Legislation to Deal with Issue of Trolley Holding Corporation

The New York, New Haven & Hartford Railroad has petitioned the Massachusetts General Court for legislation enabling it to acquire property of the New England Investment & Security Company, or such other legislation pertaining to the road's interest in that company as may be deemed necessary. The railroad directs attention to an interesting situation involving certain electric railways in which it is interested. Broad legislative authority is sought to enable the New Haven to deal with a situation which will arise next year, when $13,115,000 notes of the New England Investment & Security Company come due April 1. All of these notes are owned by the New Haven.

The New England Investment & Security Company is a voluntary association, organized in 1906 by New Haven interests to acquire shares or other securities of electric railway or power companies. It controls through ownership, directly or indirectly, all or a majority of the stocks of the Milford, Attleboro & Woonsocket Street Railway, Springfield Street Railway and Worcester Consolidated Street Railway. The company also holds by assignment dated April 1, 1909, all the interest of the Worcester Consolidated Street Railway in the capital stock of the Worcester & Webster Street Railway and Webster & Dudley Street Railway.

In addition to notes, the New England Investment & Security Company has outstanding $112,100 of 4 per cent cumulative preferred stock and $100,000 common. There was formerly $4,000,000 preferred outstanding upon which New Haven guaranteed the dividends, but practically all of it has been exchanged for first preferred stock of the Worcester Consolidated, thereby relieving the New Haven of its guaranty to that extent.

The notes which the New Haven owns were intended to bear interest at the rate of 3 per cent from date of issue, 4 per cent for the next five years and 5 per cent for the final five years. For several years no interest has been paid. Under the dissolution decree, the New Haven was supposed to dispose of its interest in the New England Investment & Security Company by April 1, 1919, but the date has been extended by the court from time to time.

It is explained that special legislation is necessary if the New Haven is to take over the properties for debt. On the other hand, the properties may be sold for the debt under the hammer.

Service Suspended in Monterey

The Monterey & Pacific Grove Railway, Monterey, Cal., discontinued service in Monterey on Dec. 5, because of the inability of its general manager to pay for its power bill. In spite of great difficulty, J. D. Brown, the local manager, has been sending out his cars for some time, even though the Public Service Commission threatened to close down on operations if he did not render payment to the power company.

The matter came to a head recently when the Coast Valley Gas & Electric Company sent a letter to Mr. Brown, telling him that further delivery of power would be discontinued if the company did not pay its bills before Dec. 1. In addition to this notice, the company also sent a communication to the City Council of Monterey informing it of the intention to close down on the power for the operation of the railway system.

Suspension in Monterey brings to an end one of the longest controversies in that section of the country. The difficulties of the company in its relations with the city of Pacific Grove were reviewed in the ELECTRIC RAILWAY JOURNAL, issue of Nov. 17.

The local manager, J. D. Brown, following the suspension, announced that he had no plans for the immediate future. He said that having no money he could not afford to operate, and he would now await developments.

Auction Sales in New York

At the public auction rooms of A. H. Muller & Sons there were sold the following securities on Dec. 26:

$5,000 Buffalo & Lake Erie Traction Company first and refunding mortgage 5 per cent bonds, 1936, twenty shares Buffalo & Lake Erie Traction Company common 11 per cent.

41 shares New York Railways, $1 lot.

100 shares Brooklyn Rapid Transit Company, old stock, $2 lot; 900 shares Brooklyn Rapid Transit Company common, old stock; 1,300 shares Brooklyn Rapid Transit Company common, old stock; certificates of deposit, $1 lot.

$50,000 Twenty-Third Street Railway refunding and improvement 5s, 50 per cent.

30 shares New York Railways, $2 lot.

100 shares Interborough Metropolitan Company common v. t. c., $5 lot.

100 shares Interborough Consolidated Company, preferred, $8 lot.

$3,500 North Carolina Public Service Company first mortgage, series "B," due April 1, 1934, 66⅔ per cent.

1⅓ shares Michigan Electric Railway preferred "A," $1 lot.

$125 Michigan Electric Railway first and refunding mortgage "A" bond, due 1948, $20 lot.

Will Discuss Extensions.—At the annual meeting of stockholders of the Buffalo & Lake Erie Traction Company, Inc., operating an interurban line between Buffalo, N. Y., and Erie, Pa., stockholders will consider proposed extensions of service in the vicinity of Erie, Pa.

$25,100,259 Spent by Boston "L" in Five Years—$10,000,000 More for 1924 and 1925

In a petition filed with the Secretary of State of Massachusetts asking legislative permission to issue bonds to an amount equal to the money paid in for stock of the West End Street Railway, which the Boston Elevated absorbed a year ago, the trustees of the Boston Elevated Railway filed a list of the total expenditures for capital purposes made since the creation of the Board of Trustees, as follows:

EXPENDITURES ON ROAD AND EQUIPMENT
JULY 1, 1918, TO OCT. 21, 1923

Elevated structures and appurtenances	$1,073,607
Surface lines	3,344,123
Carhouses and shops	3,072,742
Power houses and transmission of electricity	3,444,375
Cars	10,149,688
Miscellaneous	581,753
Total	a$21,666,289
Expenditures on road and equipment prior to July 1, 1918 for which capital had not been issued on that date	3,433,970
Total obligations for which the board of trustees has had to provide	$25,100,259

The money with which to pay for these replacements and improvements has been obtained from the following sources:

Sale of Cambridge subway	$7,868,000
Preferred stock	2,000,000
Bonds	1,986,000
Insurance and payments account real estate sold, about	1,500,000
Depreciation July 1, 1918-Oct. 1, 1923	10,521,000
Total	$23,875,000

These amounts, it is explained, by no means cover the expenditures which should be made in order to place this transportation system in the condition necessary to give satisfactory and adequate service.

The accompanying table shows expenditures which are needed in order to provide for the proper development of this system. According to the company the items for cars are less than is desirable and should be increased as soon as practicable.

Of the $9,208,032 estimated for the calendar years 1922 and 1923, $8,555,608 has been authorized and approximately $3,765,000 has been paid to date. This leaves approximately $4,790,000 of the 1923 expenditures yet to be financed.

PROPOSED EXPENDITURES FOR ROAD AND EQUIPMENT

	1922	1923	1924	1925	Total
Everett shops	$205,842	$1,190,232	$1,445,518	$2,052,180	$4,893,772
Track betterments	84,924	700,000	700,000	700,000	2,184,924
Surface carhouses—modernizing	40,715	500,000	500,000	500,000	1,540,713
Miscellaneous buses, machinery, etc.	35,127	300,000	300,000	300,000	935,127
Power—South Boston power station and conduits	397,314	1,450,000	800,000	1,400,000	4,047,314
Cars	1,715,220	1,710,000	1,000,000	800,000	5,225,220
George Street storehouse	160,000	....	....	....	160,000
Forest Hills signal system	124,010	....	....	....	124,010
Forest Hills extension	122,500	....	....	....	122,500
Neponset terminal	24,350	....	....	....	24,350
East Boston tunnel changes	....	47,800	....	....	447,800
Total	(b) $2,910,000	$6,298,032	$4,745,518	$5,752,180	$19,705,730

Approves Bond Purchase.—The State Railroad and Public Utilities Commission has approved the application of the Jackson Railway & Light Company for authority to issue $55,000 of 5 per cent gold bonds. The proceeds of the sale will be used to purchase new equipment deemed necessary for the system in Jackson, Tenn.

Extra Dividend on Illinois Traction Common.—The Illinois Traction Company, Peoria, Ill., has declared an extra dividend of $1.50 on the common stock payable on Jan. 2 to stock of record Dec. 20. The last regular dividend of the Illinois Traction on the outstanding common stock was 50 cents a share declared payable on Oct. 1 for the previous quarter. The stock is of $50 par.

Abandonment Allowed. — The Corporation Commission of Virginia granted the petition of the Virginia Railway & Power Company to abandon lines on County Street in Portsmouth. The appeal was favorably received on the grounds that the High Street line parallels it and jitney competition is too keen for its existence, as the jitneys operate on a 5-cent fare, against 6 cents charged by the company.

Abandonment Petition Deferred. — The hearing on the petition of the International Railway for permission to abandon part of its line in the city of Niagara Falls, scheduled for Dec. 17 in Buffalo, was postponed by the commission to a date to be announced after Jan. 1. Corporation Counsel Robert J. Moore of Niagara Falls asked for postponement because of pressing municipal matters.

Gold Notes Offered.—Dillon, Read & Company, New York, are offering at 99¼ and accrued interest, yielding about 6.40 per cent, $3,500,000 of the Philadelphia Rapid Transit Company's two-year 6 per cent secured gold notes. The notes are dated Dec. 1, 1923, and are due Dec. 1, 1925. The notes will be secured by deposit with the trustee of $4,667,000 Philadelphia Rapid Transit Company fifty-year 5 per cent sinking fund gold bonds, due March 1, 1962, the bonds thus being pledged at 75 per cent of their face value. The fifty-year 5 per cent gold bonds, due March 1, 1962, are a direct obligation of the Philadelphia Rapid Transit Company, specifically secured by a first lien on all of the capital stock and the leasehold of the Market Street Elevated Passenger Railway. In addition, payment of the principal and interest of these bonds is guaranteed by the Union Traction Company of Philadelphia.

Sale of Certificates Approved.—The Public Utilities Commission has approved the petition of the Memphis Street Railway, Memphis, Tenn., for permission to issue $344,000 in car trust certificates. The funds secured by the sale of the certificates, together with a $160,000 cash payment, is the purchase price of forty new double-truck cars which will be placed in service at an early date. The specifications of these cars were given in the ELECTRIC RAILWAY JOURNAL, issue of June 2. The certificates will become due and payable in annual installments of $35,000 beginning Dec. 1, 1924.

Sale Declared Legal.—Sale of common stock of the Chicago Elevated Railroad collateral trust, which controls the elevated lines, was recently declared legal by the Illinois Appellate Court. The stock in 1914 was pledged as collateral for a $14,000,000 gold note issue of the trust. The court reversed an order of Circuit Judge Hugo M. Friend. That judge enjoined the proposed sale on the petition of two holders of preferred stock. Those plaintiffs alleged the sale would be the first step in "a conspiracy to place the elevated roads under the control of Samuel Insull and the Commonwealth Edison Company." In view of the decision it is believed immediate steps will be taken to effect the sale, which had been set for Oct. 3 in New York and was stopped by temporary injunction.

Payment of Dividend Rental Deferred.—At a special meeting of the board of directors of the Interborough Rapid Transit Company, New York, N. Y., on Dec. 14 it was determined that payment of the installment of the Manhattan Railway quarterly dividend rental due Jan. 1, 1924, to Manhattan Railway stockholders participating in the plan of readjustment should be deferred. Under the plan, the Manhattan dividend rental at the rate specified in the agreement (4 per cent for the current year) is cumulative, and must be met in full before any dividends can be paid on Interborough stock.

Settlement of Lease Problem Postponed.—Official announcement has been made that it may be found desirable to postpone the question of the lease of the West Jersey & Seashore Railroad, operating steam and electric service from Camden to Atlantic City, to the Pennsylvania Railroad until the future. The Pennsylvania already owns a controlling interest in the West Jersey company. Some minority holders of West Jersey favored a rental, which would provide for a straight 6 per cent dividend, while others favored the capitalization of some part of the surplus through declaration of a stock dividend in such way as would provide a return of not less than 6 per cent on present holdings. The Pennsylvania is reported to have favored a 5 per cent return.

(a) These are gross expenditures. Credits for property charged off, property destroyed by fire, property sold, etc., have been eliminated. (b) Appropriations carried over to 1923.

Traffic and Transportation

Fares Cut in Des Moines

New Rate of Seven Cents Put Into Effect Because Stabilizing Fund Has Reached $150,000

The Des Moines, Iowa, City Railway surprised its patrons at Christmas with the announcement of a reduction in fares from 8 cents to 7 cents. The fare cut was actually announced on Dec. 22. On account of the franchise provision, which requires that five days' notice be given to the City Council of any change in fare, the new rate becomes effective on Dec. 27. The decrease really has come about as a result of the stabilizing fund reaching the $150,000 mark.

As a matter of fact, when the company's books were closed for the month of November the so-called cushion fund, provided under the franchise adopted in November, 1921, had reached $150,902 and immediately upon closing the books F. C. Chambers, president, hastened to keep faith with the public by announcing the reduction. Mr. Chambers gives credit for arriving at the goal to the co-operation of the public and the efficiency of the railway employees. He calls attention to the fact that the reduction is in excess of 12½ per cent, which is noteworthy in the case of a business operating upon such a narrow margin.

Further evidence of the company's desire to keep faith with the public is shown by the fact that coincident with the 7-cent fare becoming effective to city car riders, it will also become operative on the three lines which run outside of the city limits. Since the adoption of the new franchise patrons on the Valley Junction, Fort Des Moines and Urbandale lines have paid an additional 2 cents upon reaching the city limits. In the future 7 cents will cover one complete ride from Des Moines to the end of any of these lines.

In this connection it is also interesting to note that while the franchise entitled the company to charge 16 cents for fares on owl cars and 4 cents for school children, these provisions have never been exacted and the fare on owl cars has been 10 cents and that for school children 2½ cents.

The fare reduction is also more noteworthy when it is considered that during the past eighteen months the company has made very heavy expenditures for reconstruction and has practically completed the new Crocker Street line.

According to the terms of the franchise, if the stabilizing fund should be decreased to $100,000, the fare will revert to 8 cents, but Mr. Chambers has said that every effort will be made by his company and its employees to prevent such a contingency.

At the very time the fare reduction was announced a hearing was being held in the Polk County District Court upon the suit brought by Grant Van Horn for the North Des Moines Improvement League to test the reasonableness of the 8-cent fare provided in the franchise. Van Horn originally attempted to revoke the franchise on the score that it was invalid, but upon losing this case he amended his petition so as to confine his attack to the question of the reasonableness of the fare.

Efforts made by the company since the adoption of the franchise have been so sincere and have produced such improvements in service that the average citizen of Des Moines is taking no interest in the Van Horn case, being satisfied that the franchise is a good bargain.

Jitneys Prohibited in Gadsden

Jitneys have practically been legislated out of Gadsden, Ala. On Dec. 17 the City Council of Gadsden adopted a city ordinance prohibiting the operation of jitneys on streets where street cars of the Alabama Power Company operate. This puts the jitney out of business in Gadsden's downtown section. This ordinance was referred to in the ELECTRIC RAILWAY JOURNAL, issue of Nov. 17.

The city ordinance also prohibits the operation of jitneys from Gadsden to Alabama City and Attalla, both connected with Gadsden by electric railway. For some time past numerous jitneys have operated between Gadsden and these two towns. Taxicabs are excepted in the ordinance.

The jitney owners' association of Gadsden threatens to contest the ordinance in the courts.

New Crosstown Service in Indianapolis

Crosstown service in Washington Street, Indianapolis, became a reality on Dec. 16. At intervals from four to eight minutes throughout the day cars of the Indianapolis Street Railway will be run between Irvington and Mount Jackson, straight across Washington Street. All the cars now on the West Washington Street line will make the crosstown run, while several of those now on the East Washington line will make the entire trip. Four-minute service will be given on the crosstown line in the rush hours and from six to eight-minute service at other periods of the day.

The cars on the East Michigan Street and Brightwood lines will be rerouted downtown as a result of the establishment of the crosstown line. A plan of running two cars an hour between Irvington and Mount Jackson was tried by the company last year, but it did not prove a success.

Fare Plea Makes Progress

Council at Atlanta Appoints Committee to Inquire Into Appeal for Ten-Cent Fare

Progress is being made by the Georgia Railway & Power Company, Atlanta, Ga., in connection with its appeal for a 10-cent cash fare and the right to charge 2 cents for a transfer. The Council has appointed a committee, with Councilman Bachman at its head, to audit the company's books, investigate the statements made by the company and call a public hearing on the question.

Following this public hearing the committee will recommend to the council whether or not the petition should be granted in whole or in part. If the report is favorable, the case will be taken up with the Public Utilities Commission of the State. Several months may intervene before the matter is finally settled.

There are several features of the matter that have new angles. In the first place the company has realized the necessity for stating its case to the public fully and frankly. To this end it has opened its books to the public, told the facts in the case, and appealed for a chance to make a fair return on its earnings. In this connection it should be borne in mind that the company is seeking a return of 8 per cent on the money invested so as to establish its earning capacity and permit it to increase its borrowing power. This, in turn, will enable it to secure funds to add new track and equipment and improve its service.

Beginning several months ago the company started putting placards in its cars to show how much money it spent on the various items connected with the railway. Starting with the 7-cent fare, it showed each week how much of that 7 cents went to pay for supplies, for new equipment, for salaries, for repairs and for other purposes. At the end of this series of posters, the fraction of a cent the company actually lost was graphically shown.

The attention of the public was next turned to transfers. The company showed—still by the poster method—how each transfer was issued at a loss of more than 2 cents. It showed why the transfer system was an unfair burden.

From transfers, the advertising was turned to the increase in the cost of maintenance. Item by item, the company showed how the cost had risen in the past five years 100 or 150 or 200 per cent as the case might be. This established the increase in the cost of operation in the public mind beyond a doubt.

Next came a series of total figures—showing the great cost of maintenance and the volume of material needed just to keep the railway in operation without providing new track and new equipment.

Finally the company presented its petition to the City Council. Simultaneously, in every car in the city, there went up this placard.

"What will *you* do with your street railway?"

That is the appeal the Georgia Railway & Power Company has made all the way through on this campaign—the slogan under which it will fight for 10-cent fares and an 8 per cent return on its invested capital. It is an open invitation to the public to help the company solve its problems. In its petition the company said in effect:

> We have studied this thing from every angle—and we do not see any other way out of it.
>
> We must get more money—make a larger return in our investment—or we are stopped. We have already borrowed all the money we can. The state will not permit us to issue any more bonds.
>
> Either we must increase our income through an increase in fares—or quit.
>
> But if you, Mr. Commuter and Business Man, know any better method of getting around the situation—sit down and let us know about it.
>
> We need your help.

Immediately after the request was printed, letters began to come into the office of the company. Some were good, some bad, some indifferent. All of them indicated an interest on the part of the public, and many of them expressed a desire to help the company out of its difficulties. In a way, this was the most remarkable feature of the entire campaign.

The petition could have been taken to the Public Utilities Commission direct, but the company desired to explain the matter in advance to the public and thus to win its support by the soundness of its claims.

1,928 Los Angeles Trainmen Receive $90,000 Bonus

The fourth annual Christmas bonus was paid by the Los Angeles Railway to 1,928 trainmen, in checks ranging from $5 to $160 and totaling $90,000. The regular bonus is $60 a year, on a basis of $5 a month. Trainmen come under the bonus system when they have been in service six months. They start with an efficiency record card of 100 per cent and credits and demerits are assessed under the company's merit system, which was described in the ELECTRIC RAILWAY JOURNAL, issue of April 28, 1923, page 721.

For every month that a trainman's record is 100 per cent or better he is credited with a $5 bonus. The ten top motormen and conductors of each division and the ten top men of the safety car list were selected for special prizes running from $10 to $100 in addition to the regular bonus. In selecting these men, officials of the company were governed to a considerable extent by the general attitude and appearance of trainmen as well as by the figures of their record.

Two changes have been announced in the administration of the merit and bonus system for 1924. Demerits for which a trainman might lose some of his bonus will be canceled providing the offense is not repeated in three months. This is intended to make the system more corrective and less disciplinary. The second change is that the special awards which go to 110 men will be in even amounts. The company budget for the year assumes that every trainman participating in the bonus will receive the full amount for the time he has served. Money remaining due to some trainman not receiving full bonus will be divided evenly among the 110 men whether it amounts to $5 or $100 extra.

Saginaw Makes Good Showing

The Saginaw Transit Company, Saginaw, Mich., reported gross earnings for November of $29,646, with net after taxes of $6,044, to meet monthly interest requirements of $2,475. The company carried 465,000 passengers during November. When partial railway service was resumed in Saginaw on Nov. 1 the city had been without railway accommodations for two years. It was not until Dec. 1 that the full measure of service was restored, there.

Working Out Bus Plan in Spartanburg

While the South Carolina Gas & Electric Company, Spartanburg, S. C., is awaiting a decision of the Supreme Court on the petition of the city to make the company renew operation of its cars or forfeit its franchise the City Council and George B. Tripp, president of the company, are getting together and working out a satisfactory system of handling the buses. At a recent conference which was the outgrowth of complaints made to the City Council that buses were stopping in the middle of the city blocks to take on and discharge passengers, Mr. Tripp suggested to the Council that a space of 50 ft. should be set aside on the blocks where the buses must stop to receive and unload passengers. No automobiles would be allowed to park in these areas. Mr. Tripp will prepare a map containing his ideas with reference to handling traffic for the buses and this will be later submitted to the City Council.

Commission Hears Ten-Cent Fare Petition of Kingston Company

A hearing was held before the Public Service Commission on Dec. 11 in the matter of the petition of the Kingston Consolidated Railroad for permission to charge an 8-cent ticket and a 10-cent cash fare in lieu of the 7-cent fare now charged in Kingston, N. Y. Howard Chipp, attorney, and G. B. te Bow, general manager, represented the company.

Mr. te Bow testified as to revenues and expenses covering operations of the Kingston road for several years. He said the operating revenues for the first seven months in 1923 were $169,588. The operating expenses for the same period were $129,026 and the taxes paid by the company amounted to $11,367. Another hearing will be held on Jan. 8.

Los Angeles Urged to Hire Traffic Expert

The Los Angeles Traffic Commission recommended on Dec. 18 to the Los Angeles City Council and the Board of Supervisors of Los Angeles County that a transportation expert be employed with a view to working out a plan for rapid transit both within the city of Los Angeles and to all outlying points. It is reported that Major R. F. Kelker, Jr., Chicago transportation expert, who prepared the plans for the Chicago rapid transit system, would be recommended to work out the proposed Los Angeles metropolitan railway system. The plans of the traffic commission involve the construction of elevated lines, subways and open cuts. One of the difficulties encountered by expert engineers in the past in studying the transit situation in Los Angeles is the lack of existing loop lines and the comparatively few crosstown lines.

The traffic commission outlines in its resolution to the City Council and county officials that it was prompted in making the recommendation for a proposed transportation survey because of the "ever increasing and harassing congestion" in the city, and that for that reason there is a need "for a thorough survey of the entire problem of public transportation in the metropolitan area of Los Angeles."

P.R.T. Plans Ordinances for Bus Development

The Philadelphia Rapid Transit Company plans the early introduction of enabling ordinances for consideration of the incoming city administration in order to meet the growing demand, through the newspapers and otherwise, for a bus line on Broad Street. This service as proposed will provide increased carrying capacity into and out of the delivery district. The universal fare will be 10 cents. Passengers originating at or destined to points away from motor bus lines will continue to use the 3-cent exchange ticket privilege between buses and connecting street cars to complete their ride. Transfers between buses cannot be given, because each passenger is to be supplied with a seat, which serves to limit the maximum carrying capacity of the buses.

Three-Cent Fare for School Children.—Half fare for Oakland school children or a rate of 3 cents went into effect on Dec. 10. The San Francisco-Oakland Terminal Railways placed books of tickets on sale which will not be accepted on Sundays, Saturdays, holidays or during periods of vacation. They will be honored only during such hours as school attendants use the company's service. This is in accordance with the ruling of the State Railroad Commission.

Must Come to Dead Stop.—The Public Service Commission has directed the Hudson Valley Railway to cause all of its cars to come to a full stop before crossing what is known as the Pratt's crossing on the Waterville Mechanicville highway in Half Moon, Saratoga County, N. Y. In view of the heavy traffic over the trolley crossing and the frequency of trolley car movements the crossing is of such character as to make it dangerous. In addition the speed of cars has been restricted at the crossing, but the commission holds that as a further need to protect the traveling public all cars must come to a dead stop.

Rochester-Erie Freight Service.—Through freight service will be installed over the Rochester, Lockport & Buffalo Railroad and Buffalo & Lake Erie Traction Company from Rochester, N. Y., to Erie, Pa., according to an announcement at the Rochester, Lockport & Buffalo offices. The institution of this service will permit thirty-six-hour delivery between the two cities and will eliminate trucking charges in Buffalo, through the two companies using the same freight station in Buffalo. The Rochester, Lockport & Buffalo also has opened half-hour passenger service between Rochester and Brockport during eleven hours of the day. It was planned to start the new service on Dec. 29.

Railway Wins Injunction.—An injunction obtained several months ago by the Kansas City Railways, Kansas City, Mo., against the enforcement of an ordinance specifying changes in street car stops at Thirty-first and Main Streets was made permanent Dec. 19 by Judge Stone in the United States Circuit Court. The ordinance came as a result of a protest made by property owners on the north side of Thirty-first Street, who maintained that their business suffered because the cars stopped at a point distant from their stores. The railways held that the stopping of the cars before crossing Thirty-first Street would delay the traffic. According to the ruling of Judge Stone the cars will continue to stop at the present designations.

Parked Automobiles Tagged. — In connection with the recent safety campaign conducted by the motormen and conductors of the Lehigh Valley Transit Company, Allentown, Pa., the members of the Safety Committee went out and tagged all parked automobiles on the Saturday afternoon and evening before Christmas in the various cities and towns along the line with a ticket which is a facsimile of the Police Department tag. One side of the tag shows three automobiles with safety signals for drivers, namely, "Turn to the Right, Stop and Turn to the Left." The other side said: "You are tagged for safety by the General Safety Committee, Transportation Department, Lehigh Valley Transit Company." The tag gave statistics on the number of people killed by automobiles in the United States and asked for the co-operation of the tagged one in stopping accidents. The safety campaign of this company, referred to previously in these pages, was entered into very enthusiastically by the employees and patrons.

Personal Items

Mr. Livers Resigns

Achieved Success with Charlottesville & Albemarle Railway—Active in Local Improvement Projects

John L. Livers has resigned as president of the Charlottesville & Albemarle Railway, Charlottesville, Va., and vice-president of the Virginia Western Power Company, with which the railway and light properties were recently merged. The first week in January he will leave with his family for Florida, and intimates that he plans to pay a long intended visit to Cuba and possibly Mexico. It is understood that Mr. Livers will continue to make Charlottesville his home during the summer and will keep up his interest in the suburban development of the community notwithstanding. He is president and the principal stockholder in the Redland Land Corporation, which is developing the Jefferson Park and the Meadow Brook additions at Charlottesville.

"Johnny" Livers, as Mr. Livers is familiarly known, took over the Charlottesville properties as manager in 1912. Later he was made vice-president as well as manager, and in 1921 he was elected president. He completely rehabilitated the utility properties there and placed them on a dividend paying basis. This was certainly no inconsiderable job, but in carrying it through Mr. Livers resorted to many new and novel ideas. He was quick to realize the value of consumer co-operation, but this is difficult to achieve even in a small community. As a result of his efforts Charlottesville, a city of 7,000 population, has a five minute headway the year round, and a 5-cent fare. Not only this but Mr. Livers has been conspicuous for his uniform and cordial support of every project that would make for the improvement of local conditions and the industrial and civic betterment of the whole section.

The extent to which he endeared himself to the entire community is attested by the editorial "A Model of Civic Conduct," published by the Charlottesville *Daily Progress* in its issue of Dec. 22. In the course of a column editorial expressing its regret at his loss to the community that paper said:

> The most conspicuous trait of Mr. Livers was a remarkable modesty that amounted nearly to self-effacement. He was everything for the cause he had to serve, or object to attain, but next to nothing for himself. And he was indifferent in this way as to his own recognition, without being in the least shrinking or diffident in pushing the cause or interest in which he had faith. He was, however, essentially a man of achievement and vision that amounted to genius, and this community will long miss his far-seeing and sympathetic mind in its future counsels, and wonderful talent for overcoming difficulties in execution.

Mr. Livers was born in Gettysburg, Pa., in 1878. Starting as a lineman at the age of eighteen he worked for several years in various phases of construction work. He then entered the operating and contracting field, and during a period of twelve years constructed more than 100 electric light and power plants. As stated previously he took charge of the Charlottesville property in 1912.

John Kelly has replaced John A. Roach as roadmaster of the East St. Louis Railway, East St. Louis, Ill.

Floyd E. Harper has succeeded H. B. Hurd as secretary of the Dubuque Electric Company. C. B. Zeigler has replaced J. N. McCallum as treasurer.

Harry T. Edgar has assumed the presidency of the Paducah Electric Company, Paducah, Ky. He is also president of the Keokuk Electric Company, Keokuk, Iowa.

J. W. Muir has succeeded J. A. Shepherd as auditor and assistant treasurer of the Alabama Power Company with office in Birmingham.

S. W. Willers has succeeded E. Curtis as chief engineer of the power station of the Fort Smith Light & Traction Company, Fort Smith, Ark.

Charles Dunn has succeeded Hamilton Baluss as general manager of the Susquehanna Traction Company, Lock Haven, Pa.

F. A. Brown, who has been in charge of the statistical department of the Wisconsin-Minnesota Light & Power Company in Eau Claire for more than a year, has been transferred to the Northern States Power Company's office at Minneapolis as head of the company's statistical department.

William Mangold has completed twenty-five years' service with the United Railways & Electric Company, Baltimore. He has served in different capacities from clerk and stenographer until he became chief clerk under the present superintendent.

Scott S. Crane, general manager of the Altoona & Logan Valley Electric Railway, Altoona, Pa., has completed his twenty-eighth anniversary as general manager at Altoona. Mr. Crane entered the Logan Valley service in 1895 following three years in Altoona as a telegraph operator for the Pennsylvania Railroad.

Harry A. Brinkerhoff, consulting engineer, was recently elected the first city manager of Portland, Me., at the organization meeting of the new City Council. He has had large experience in handling important engineering projects in many parts of the United States and Canada. Until two years ago, when he established himself as a consulting engineer, he was for more than twenty years with Westinghouse, Church, Kerr & Company of New York. Mr. Brinkerhoff is a member of the

American Society of Mechanical Engineers.

John J. K. Caskie, for several years associated with the claims and legal department of Mitten Management in the operation of the Philadelphia Rapid Transit Company, will become general attorney for the International Railway, Buffalo, Jan. 1, 1924, according to an announcement by Herbert G. Tulley, president of the International. Mr. Caskie will have charge of all negligence claims and litigated cases. The appointment of Mr. Caskie does not affect the status of Thomas Penney, who remains general counsel for the International Railway.

Charles H. Quinn, chief electrical engineer of the Norfolk & Western Railway, has resigned. His first railroad experience was on the Southern Pacific at San Antonio, Tex., where he entered the service as machinist's apprentice. In 1901 he went to the Norfolk & Western as a draftsman. One year later he was promoted to electrical foreman, which position he held for five years. In 1906 he was appointed assistant engineer of motive power. Nine years ago Mr. Quinn was promoted to chief electrical engineer of the road, which position he held up to the time of his resignation.

Obituary

Alfred Hare, railroad builder of Oklahoma, died recently in Oklahoma City. He was a prominent factor in the promotion and building of the interurban railway between the cities of Tecumseh and Shawnee.

J. W. Waggener, formerly secretary of the Atchison Railway, Light & Power Company, Atchison, Kan., died on Nov. 23, 1923. Mr. Waggener was general superintendent of the company from 1909 to 1922, at which time he became secretary and C. A. Leland, Jr., became general superintendent. Mr. Waggener belonged to one of the prominent families of Atchison. His death was a distinct loss to the general industrial life of the city.

Stephen C. Mason, president of the National Association of Manufacturers from 1918 to 1921, died recently at his home in Pittsburgh. Since 1896 he was secretary and director of the McConway & Torley Company and was widely known in the railroad field. At the age of nineteen he went to work on the Connecticut & Passumpsie Railroad. Eight years later he joined the Interstate Commerce Commission and here he was in charge of the compilation and publication of the commission's statistics of railways in the United States. He was a member of the National Industrial Conference Board, Pittsburgh Chamber of Commerce, the Railway Club of Pittsburgh and of other prominent associations. He was one of the leading advocates of the open shop as a solution of the labor problem.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Market for Second-Hand Safety Cars

Heavier Traffic Has Caused Substitution of Larger Cars and Safety Cars Are Available at a Low Price

A fairly good market for safety cars is reported by dealers in second-hand railway equipment. At the present time a street railway in one of the larger cities is replacing a number of its single-truck one-man safety cars by larger units. This is being done because the traffic on the line where these cars were formerly used has been built up to a point where the railway feels that cars of larger capacity are needed. As a result of the change there are available a number of one-man Birney cars at a comparatively low price. These cars have been operated for a short period of time only, and they have been well maintained. They are therefore in first class condition.

A considerable saving in first cost might be accomplished by the purchase of such cars. It is pointed out that the operating cost being much lower than that of a heavier double-truck car, railways could save money by the use of safety cars in the off-peak period. The fact that these cars can be purchased at such a reduced price might make it possible for the railway to make such an investment for use only during those hours. Hence, they might be used on a route where traffic was sufficiently heavy to demand two-man cars in the rush hours. Such a proceeding would scarcely be economical if the cars had to be purchased at the original cost at which they were obtained from the builders.

A number of railways have recently purchased second-hand safety cars. In one case this was done because it was desired to increase service slightly on lines where these cars were already in service. In another case they were bought for service on lines with very light traffic, and it was apparently the idea of the railway to purchase rolling stock as cheaply as possible.

The light weight of the safety car is a favorable factor where shipping charges are to be considered.

Railways Buying Auto Sweepers

In preparation for their annual snow-fighting campaign many railways have recently been buying automobile snow-sweeping equipment. The Fox Rotary Snow Broom Company reports that this apparatus is being used to augment the regular snow sweepers on many properties. In one case the railway uses the automobile sweeper to clean out wyes where the rail sweepers operate with difficulty and which were formerly cleaned by hand labor. This apparatus has been found useful also for removing the ridge of snow left by the rail sweepers between the tracks. Another advantage claimed is that an auto sweeper is not tied up by other vehicles stalled on the tracks. They are useful also where storage battery cars are operated and the power is insufficient to climb a steep grade and at the same time operate the brooms.

Dividend to Be Paid in Stock

A plan for taking care of dividends accumulated on the preferred stock since 1913 has been proposed by a committee of stockholders of the Laconia Car Company. It provides for an increase of the present authorized common stock from 10,000 shares to 65,000 shares of no par. In lieu of accumulated dividends on preferred, 10,000 shares of the increased authorized common are to be given preferred stockholders, this to be made convertible into common on the basis of four and a half shares of common for each share of preferred, if converted prior to March 1, 1924, and four shares of common for each share of preferred thereafter.

Record Set by Wire Works

The weekly average production by the Chicago Works of the Western Electric Company during November was 565,795,000 ft. of conductor wire. The total production for the month was 2 263,180,000 ft. In four weeks the Chicago factory almost surpassed the best previous record for a five-week month. Output is stated in "conductor feet" because of the fact that different sizes of cable are made up of a different number of pairs of wire. The conductor foot is a term representing the amount of wire going into cable of all sizes and is a standard unit of measurement for purposes of comparison.

Metal, Coal and Material Prices

Metals—New York	**Dec. 26, 1923**
Copper, electrolytic, cents per lb.	13.00
Copper wire base, cents per lb.	15.625
Lead, cents per lb.	7.45
Zinc, cents per lb.	6.62
Tin, Straits, cents per lb.	47.25
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.67
Somerset mine run, Boston, net tons	2.125
Pittsburgh mine run, Pittsburgh, net tons	2.00
Franklin, Ill., screenings, Chicago, net tons	1.95
Central, Ill., screenings, Chicago, net tons	1.575
Kansas screenings, Kansas City, net tons	2.00
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$6.65
Weatherproof wire base, N. Y., cents per lb.	17.50
Cement, Chicago net prices, without bags	$2.10
Linseed oil (5-bbl. lots), N. Y., per gal.	$0.93
White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots	11.255
Turpentine, (bbl. lots), N. Y., per gal.	$0.92

Paving Brick Shipments Remain High

Considering seasonal influences, shipments of vitrified paving brick for November were running above normal, according to a report just made by the National Paving Brick Manufacturers' Association. For the first time since last spring the total number of brick manufactured for the month ran greatly in excess of shipments, indicating that companies are manufacturing for stock in anticipation of late winter and early spring shipments.

Larger Motors Being Installed on Salt Lake City Cars

Installation of larger motors in the equipment used by the Salt Lake & Utah Railroad and the construction of new sidings for accommodating longer trains are now going forward on this line, involving an expenditure of $50,000. The additional sidings are being placed at the towns of Bringhurst and Cutler.

With the installation of the larger motors, fifteen cars of freight can be hauled at one time and double this number of empty cars can be handled by the new locomotives. The electric locomotives will weigh 120,000 lb. and will be equipped with larger axles than the present equipment and also with journal boxes. The new equipment is expected to arrive in time to handle the heavy freight work of the early fall of 1924.

Railroad Tie Producers Will Meet

The sixth annual convention of the National Association of Railroad Tie Producers will be held in Kansas City, Mo., at the Hotel Muehlebach, on Jan. 17-18, 1924. Prominent speakers will discuss subjects of interest to cross-tie producers. A feature of the meeting will be round-table talks, in which the producers themselves will discuss their problems.

Rolling Stock

Des Moines City Railway is expecting to put ten new cars into service early in the new year. Twenty cars were ordered July 1, but there have been numerous delays and no promise of delivery has yet been secured for the second ten. The detailed specifications of the cars follow:

Builder of car body		McGuire-Cummings Manufacturing Company
Type of car		Semi-convertible motor passenger
Seating capacity		48
Weight	Car body	20,000 lb.
	Trucks	10,000 lb.
	Equipment	8,000 lb.
	Total	38,000 lb.
Bolster centers, length		20 ft. 6 in.
Length over all		46 ft. 0 in.
Truck wheelbase		5 ft. 6 in.
Width over all		8 ft. 2 in.
Body		All steel
Interior trim		Light cherry
Headlining		Agasote
Roof		Arch
Air brakes		General Electric
Armature bearings		Sleeve
Axles		Quenched and tempered
Bumpers		Channel
Car signal system		Faraday
Car trimmings		Polished bronze
Center and side bearings		Plain
Control		K 35-JJ
Couplers		Portable
Curtain fixtures		Curtain supply
Curtain material		Pantasote
Destination signs		Keystone
Door-operating mechanism		National Pneumatic
Fenders or wheelguards		H. B.
Gears and pinions		G. E. Grade M
Hand brakes		Peacock
Heater equipment		Consolidated electric
Headlights		Golden Glow
Journal bearings		Plain
Journal boxes		McGuire-Cummings
Lightning arresters		General Electric
Motors		Four G. E. 247-I
Motors		Outside hung
Paint, varnish or enamel		Vitrolite
Registers		International No. 5
Sanders		Des Moines City Railway type
Sash fixtures		Dayton Manufacturing Company
Seats		Wakefield
Seating material		Cane
Springs		Railway spring
Step treads		Kass-Feralun
Trolley base		U. S.-13-E
Trucks		McGuire-Cummings
Ventilators		Utility
Wheels		Rolled steel—26 in.

Track and Line

Long Beach Railway, Long Beach, L. I., has applied to the Public Service Commission for authority to construct and operate the entire street railway in Long Beach as contemplated in the articles of incorporation of the company. The company has constructed and operated a part of the line and it has now asked the necessary state authority to build and operate from Park Street and Minnesota Avenue to Beach Street to New York Avenue and then to Park Street, making a continuous loop in Long Beach's street railway service.

Power Houses, Shops and Buildings

British Columbia Electric Railway, Vancouver, B. C., will shortly award the contract for the building of the new power house which will house a turbine of 25,000 hp. The entire project will cost in the neighborhood of $1,500,000.

Trade Notes

Philip L. Thomson, publicity director of the Western Electric Company, has been elected president of the Association of National Advertisers. His election follows successful service as director and since 1921 as vice-president of the association. Mr. Thomson began his business career in 1903 following his graduation from Union College and from Harvard University. For two years Mr. Thomson was employed in the Chicago office of the Western Electric Company. In 1905 he went to Kansas City. Then he became successively manager of the company's headquarters at Pittsburgh and publicity director, in charge of all publicity activities. In this capacity Mr. Thomson has been identified with the development of Western Electric advertising and publicity in this country, and last spring he spent two months in Europe in connection with the publicity problems of the International Western Electric Company.

Nicholas M. DuChemin has assumed the duties of general superintendent of the West Lynn plant of the General Electric Company following the death of William J. Lloyd. He joined the General Electric apprentice school at the River Works in Lynn and also the engineering school. In addition to this he attended the Suffolk Law School in Boston and took a year's course at the Boston University. During the years 1917 to 1919 he was in the United States navy, enlisting as a seaman and finishing with the commission of lieutenant in charge of construction work for aviation uses. Following his naval service he returned to the Lynn plant of the General Electric Company as a boring mill hand. He soon won promotion and his safety work caused his being put in charge of the Bedeaux point system in the West Lynn plant, the position he occupied when he received his recent appointment as general superintendent.

New Advertising Literature

Combustion Engineering Corporation, New York, N. Y., has published a pamphlet describing the new Frederick stoker. The pamphlet contains a list of a few representative installations of the new Frederick stoker.

Irving Iron Works Company, Long Island City, N. Y., has issued a pamphlet entitled "Safety Under Foot." This pamphlet contains a table of safe loads showing the maximum allowable fiber stress on Irving subways of all types.

Fuller-Lehigh Company, Fullerton, Pa., has issued bulletin No. 900, "Pulverized Coal for Boilers," Fuller-Lehigh Equipment pamphlet and Fuller News, featuring the Fuller-Kinyon conveying system. These three pamphlets, recently released, embody the latest information on pulverized coal as a fuel, both preparation and application.

Carnegie Steel Company, Pittsburgh, Pa., has available to users of steel the ninth edition of the shape book. The new edition is the result of a thorough check and revision of all the sections rolled by the company on its shape, rail, bar and plate mills. While no important changes have been made in the regular sizes of structural and bar mill sizes of beams, channels, angles, tees and zees, numerous changes have been made in the special sections, such as concrete reinforcement bars, window and casement sections, automobile rim sections and other miscellaneous bar mill sections. Certain rails and splice bar sections which have become obsolete since the issue of the preceding edition have been eliminated in the present issue.

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When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

The Value of the Statistical Number

The following is an excerpt from the record in a recent court proceeding:

Q. Have you some figures taken from the ELECTRIC RAILWAY JOURNAL?

A. I have.

Q. What is the ELECTRIC RAILWAY JOURNAL?

A. It is a publication generally recognized as an authority on street railway operation.

Q. Have you the figures shown by the ELECTRIC RAILWAY JOURNAL of the cars ordered by city railways within the United States during the eleven years past?

A. I have.

Q. How many cars have been ordered during the past eleven years in the United States?

A. 28,417.

Q. Of that number, how many were open cars?

A. 342.

Q. Have there been any open cars ordered within the United States, according to the articles of the ELECTRIC RAILWAY JOURNAL, since 1916?

A. No.

Q. In 1916 how many cars were ordered?

A. 3,046.

Q. How many of these were open cars?

A. 131 were open cars, or 4.31 per cent.

Q. As you state, no open cars have been ordered since 1916. Is that correct?

A. That is correct.

Q. What was the total number of cars ordered in 1917?

A. 1,998.

Q. In 1918?

A. 1,842.

Q. In 1919?

A. 2,129.

Q. And the following year?

A. 2,889.

Q. And in 1921?

A. 1,059. I might add that these figures cover cars for city service only.

Tie-up with this!

Testimony, like that reprinted at the left, indicates the reliance placed on the Statistical Issue of ELECTRIC RAILWAY JOURNAL.

We repeat—the Annual Statistical Issue is depended upon — used — re-used and kept for reference.

Your advertisement in such a medium will command attention.

Wire Your reservation
Last forms close January 2.

Our Service Department will gladly co-operate in the preparation of appropriate and effective advertising copy without charge. Space rates on request.

JANUARY 5, 1924
ELECTRIC RAILWAY JOURNAL
The Annual Statistical and Review Number

ELECTRIC RAILWAY JOURNAL
Tenth Avenue at Thirty-sixth Street, New York

TIMKEN

Timken Equipped

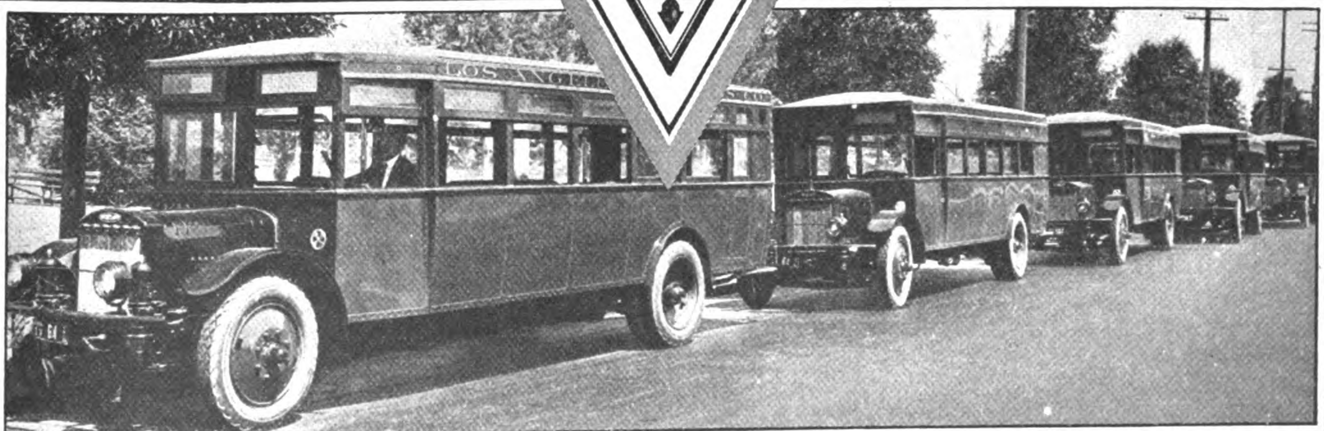
Timken is equipped by experience, by engineering ability and by manufacturing facilities to meet new developments in automotive transportation.

For twenty-five years Timken Axle designing has constantly anticipated and been ready for such developments.

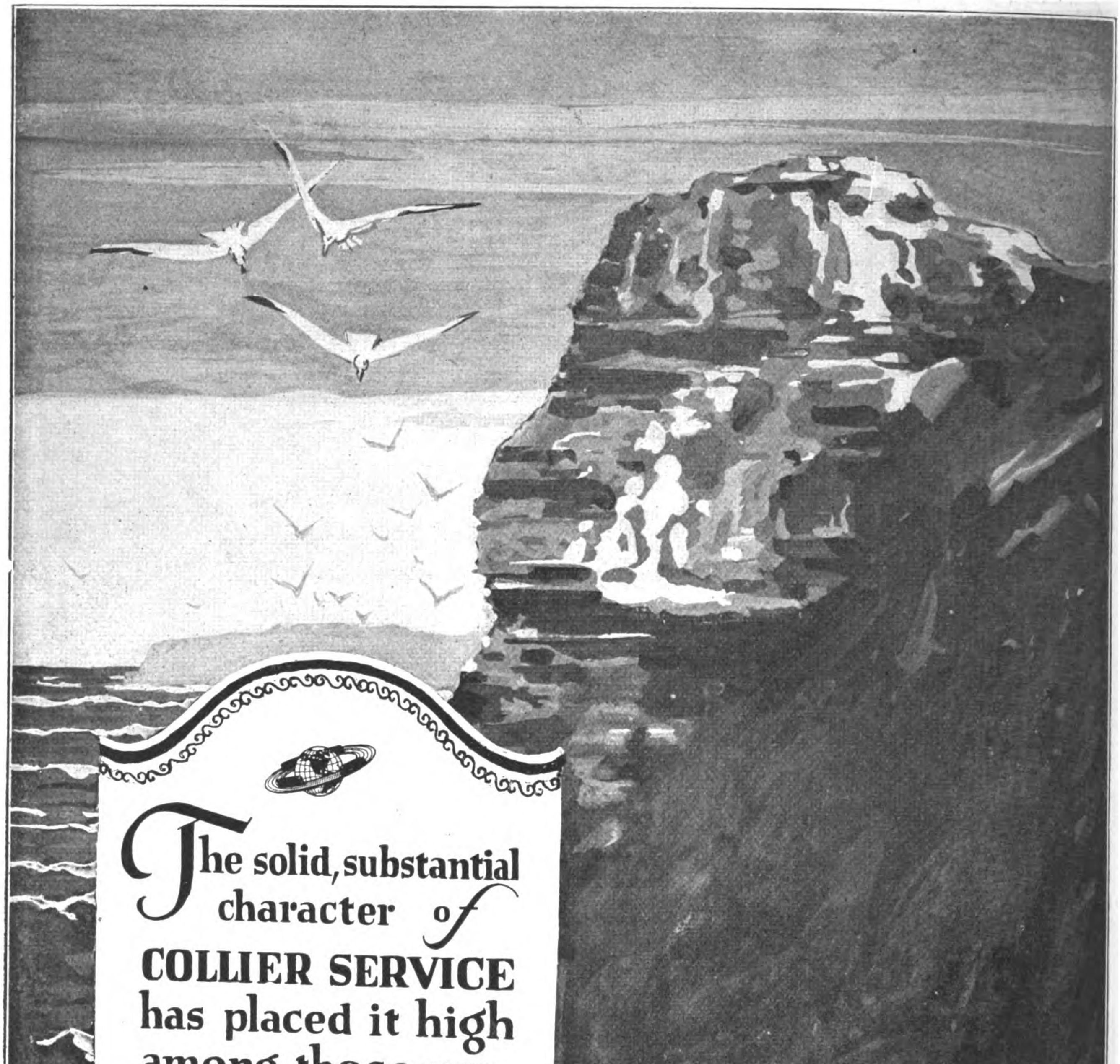
It is not strange that the most forward-looking and progressive motor-bus designers in the field today are building Timken-equipped buses.

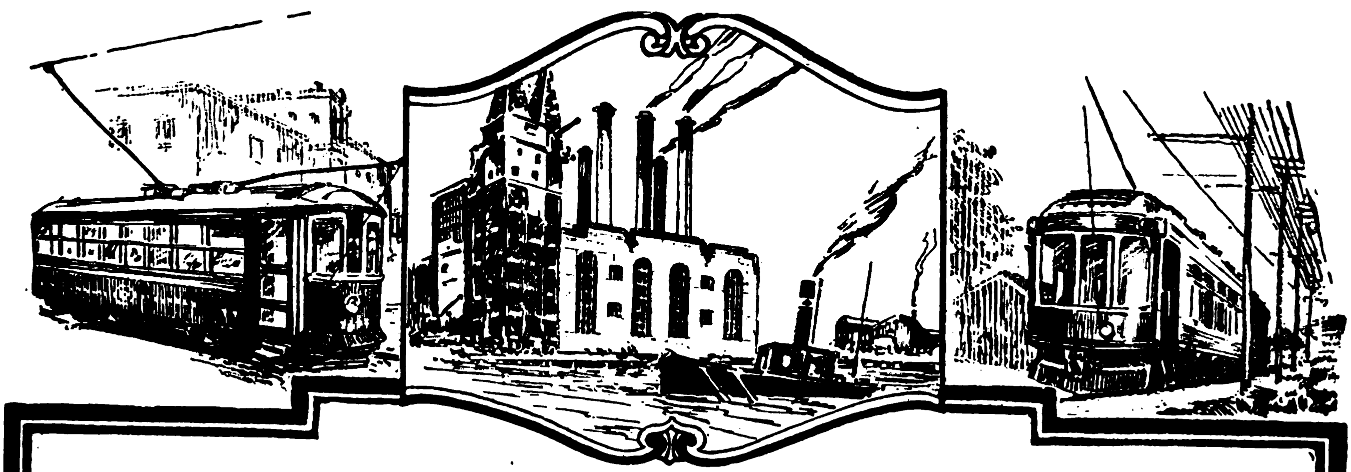
THE TIMKEN-DETROIT
AXLE COMPANY
Detroit, Michigan

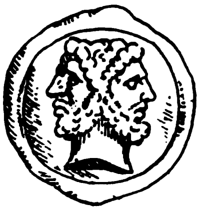
DTA CO



AXLES


The solid, substantial character of
COLLIER SERVICE
has placed it high among those permanent organizations recognized as National Institutions
Barron G. Collier
INCORPORATED





JANVS

the Roman God, after whom January was named,
was shown on ancient coins as having two faces—
one looking forward, one looking back.

This time of the year is a good time to look back on 1923 and to look forward into 1924.

1923 was a wonderful year for us. More and more Electric Railways came to us for help in conserving Equipment and Power through correct and scientific lubrication.

They have shown their appreciation of Texaco Service (the right oil in the right place in the right amount—and the co-operation of Texaco Engineers) by renewing their contracts.

From where we stand now, 1924 gives every promise of being a mighty fine year for us and a year of satisfaction to numbers of roads who acknowledge the correctness of the Texaco Policy by the pleasant continuation of their patronage.

We thank them.

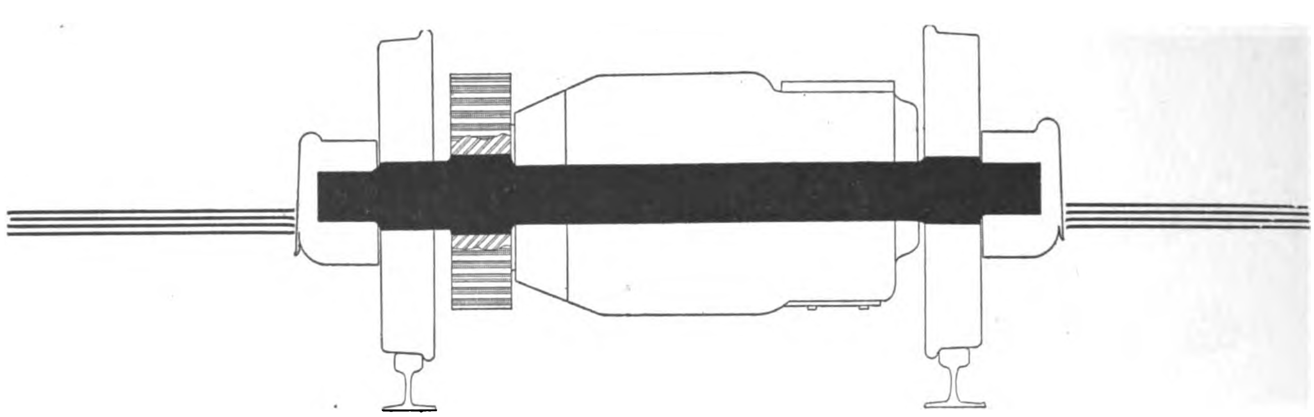
For 1924 our Engineering forces have been augmented and our deliveries for service have been expanded to take on all the new business the year will bring us.

We are here for service and shall welcome the opportunity of outlining Texaco Lubricating Service any time you call on us.

We will thank you for the opportunity—and you will thank us for the *results.*

There is a Texaco Lubricant for every purpose—
ROLLING STOCK, POWER PLANT, SUB-STATION—EVERYWHERE

TEXACO THE TEXAS C[illegible] TEXACO
[illegible]



MOTOR AXLES

Full reliance can be placed in a Standard Steel Works Motor Axle. It is made from open hearth hammered steel and in no instance has its manufacture been hurried through in order to reduce production costs.

Any difference you may find in the cost of Standard Steel Works Forgings is a low price to pay for absolute dependability.

"Not only to make better products but to make them better understood—not only to sell but to serve, assisting those who buy to choose as well as use their purchases—this is the privilege, if not the practice of all modern manufacturers."—Vauclain.

STANDARD STEEL WORKS COMPANY

PHILADELPHIA, PA.

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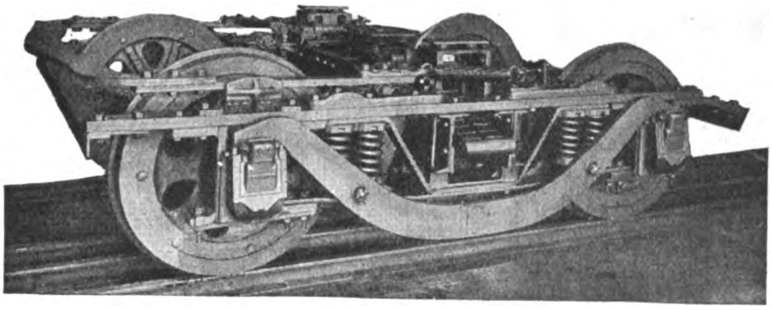


Type "AA" Motor Truck

For Heavy High-Speed Electric Railway Service Baldwin Motor Trucks are Efficient and Economical

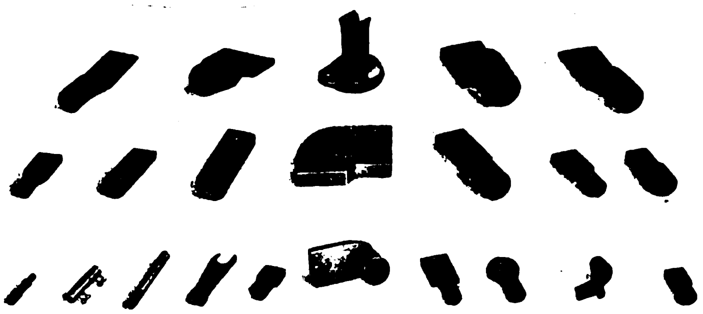
This type of Baldwin Improved Motor Truck is specially recommended on long interurban lines, where "limited" or sleeping cars are operated. It is also suitable for use under double-truck electric locomotives.

These trucks permit of easy inspection and repairs, and show low maintenance costs in operation.

Our nearest representative will furnish detailed information upon request.

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA, U. S. A. **Cable Address, "Baldwin, Philadelphia"**



Types of COLUMBIA Terminals

—that insure desired conductivity, strength and other elements.

COLUMBIA MACHINE WORKS

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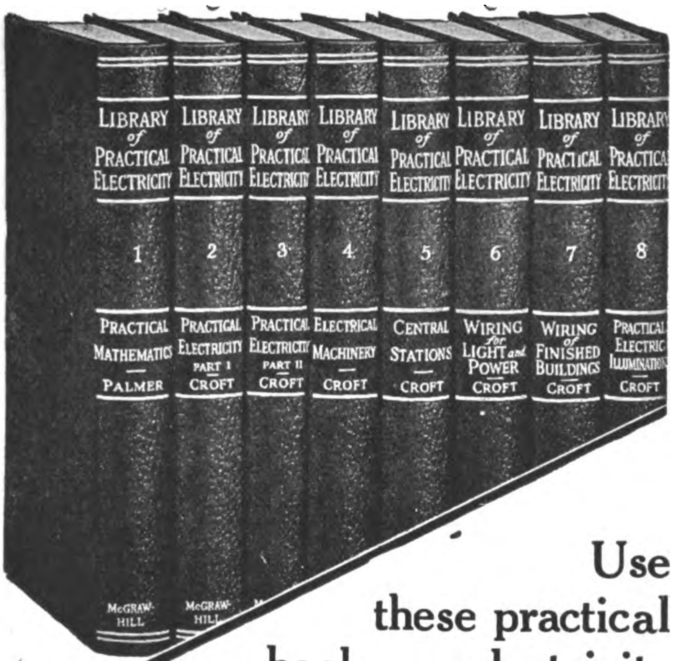
LIBRARY of PRACTICAL ELECTRICITY
1 PRACTICAL MATHEMATICS PALMER
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4 ELECTRICAL MACHINERY CROFT
5 CENTRAL STATIONS CROFT
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Use these practical books on electricity for 10 days *FREE!*

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Croft tells you the things you need to know about motors, generators, armatures, commutators, transformers, circuits, currents, switchboards, distribution systems—electrical machinery of every type, its installation, operation and repair—wiring for light and power—how to do it mechanically perfect, in accordance with the National Electrical Code—wiring of finished buildings—underwriters' and municipal requirements—how to do a complete job, from estimating it, to completion—illumination in its every phase—the latest and most improved methods of lighting—lamps and lighting effects, etc.

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Fill in and mail the coupon attached and we will send you the entire set of eight volumes for ten days' Free Examination. We take all the risk—pay all charges. You assume no obligation—you pay nothing unless you decide to keep the books. Then $1.50 in ten days and the balance at the rate of $2.00 a month. Send the coupon NOW and see the books for yourself!

Free Examination Coupon

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The "A.B.P." is built upon and revolves around the following set of standards—

STANDARDS *of* PRACTICE

THE publisher of a business paper should dedicate his best efforts to the cause of Business and Social Service, and to this end should pledge himself—

1. To consider, first, the interests of the subscriber.
2. To subscribe to and work for truth and honesty in all departments.
3. To eliminate, in so far as possible, his personal opinions from his news columns, but to be a leader of thought in his editorial columns, and to make his criticisms constructive.
4. To refuse to publish "puffs," free reading notices or paid "write-ups"; to keep his reading columns independent of advertising considerations, and to measure all news by this standard: "Is it real news?"
5. To decline any advertisement which has a tendency to mislead or which does not conform to business integrity.
6. To solicit subscriptions and advertising solely upon the merits of the publication.
7. To supply advertisers with full information regarding character and extent of circulation statements, subjects to proper and authentic verification.
8. To co-operate with all organizations and individuals engaged in creative advertising work.
9. To avoid unfair competition.
10. To determine what is the highest and largest function of the field which he serves, and then to strive in every legitimate way to promote that function.

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"The Birthplace of the Safety Car"

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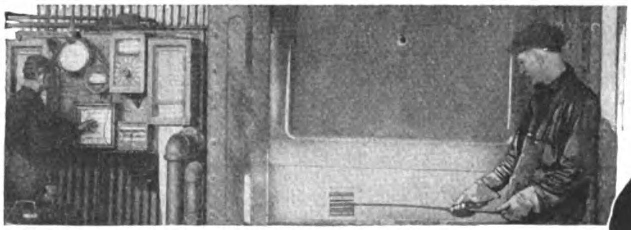

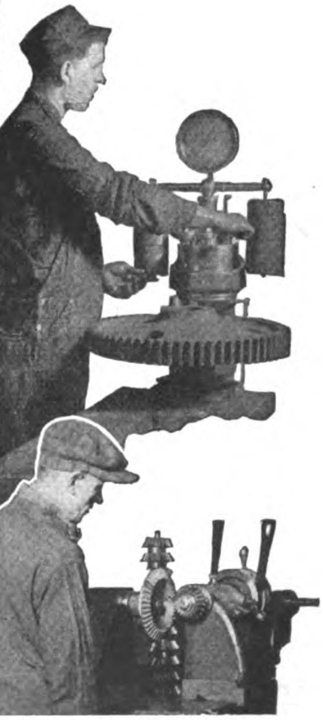

We do not know of any Heat Treatment as careful and thorough, nor any inspection as complete and rigid as we apply to all Nuttall Gearing. We do not know how to make Nuttall Gears any better.

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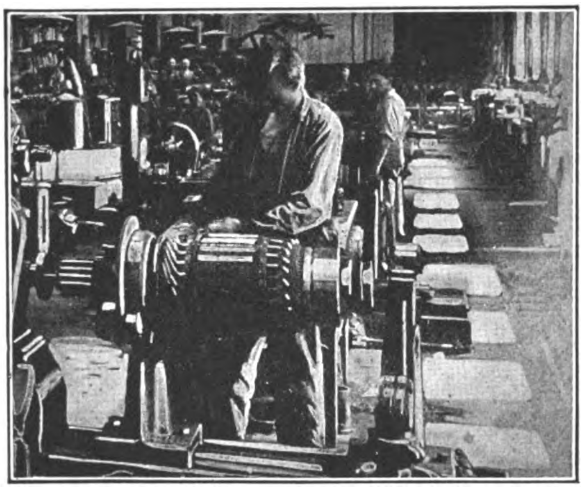

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Black Varnished Cambric

30% Higher Dielectric Strength
100% Better Heat Resistance
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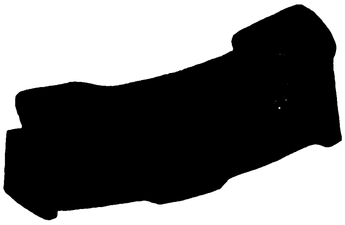
A.E.R.A. Standards

Diamond "S" Steel Back is the Best Type

Standard Patterns for

SAFETY CAR



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Nachod Spells Safety

Nachod Signals safeguard and aid your traffic.

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WIRES, CABLES AND CABLE ACCESSORIES
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Third Rail Insulators, Trolley Bases, Harps and Wheels, Bronze and Malleable Iron Frogs, Crossings, Section Insulators, Section Switches

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Shaw Lightning Arresters

Standard in the Electric Industries for 35 years

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Lapp Insulator Co. Inc. Le Roy, N.Y.
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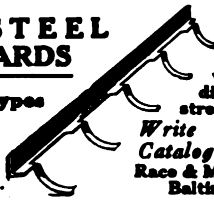
GODWIN STEEL PAVING GUARDS

Adapted to all types of rails and paving.

W. S. GODWIN CO., Inc.



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Send for new
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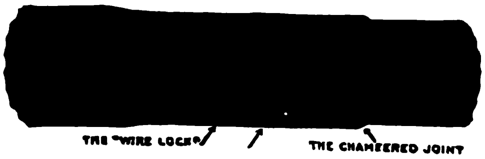

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Lowest Cost
Least Maintenance
Lightest Weight
Greatest Adaptability

Catalog complete with engineering data sent on request

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Plant—Texarkana Beaumont Galveston

MONEY SAVERS TO RAILWAYS

Treated railway ties, poles, piling, bridge timbers, etc.

See our full page advertisement in last week's issue.

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205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of
Special Work for Street Railways

Frogs, Crossings, Switches and Mates
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Kerwin Portable Crossovers
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DUNDEE "A" AND "B" FRICTION TAPES

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FRICTION TAPE
THE OKONITE COMPANY
PASSAIC, N.J.
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Great Adhesive Strength
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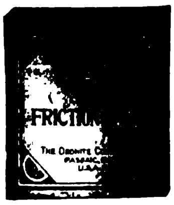
Long Life
Price Right



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Incorporated 1884
Sales Offices: New York—Atlanta—San Francisco
Agents: Central Electric Co., Chicago, Ill.; Pettingell-Andrews Co., Boston, Mass.; The F. D. Lawrence Electric Co., Cincinnati, Ohio; Novelty Electric Co., Philadelphia, Pa.

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U. S. ELECTRIC AUTOMATIC SIGNAL

for single track block signal protection

United States Electric Signal Co.
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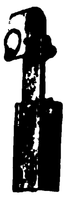

Peirce Sign Hangers For Span Wires

The hinged joint keeps the sign in position at all times, regardless of the twisting of the span wires.

HUBBARD & COMPANY
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THE BABCOCK & WILCOX COMPANY
85 LIBERTY STREET, NEW YORK

Builders since 1868 of Water Tube Boilers of continuing reliability

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Lorain Special Trackwork Girder Rails

Electrically Welded Joints

THE LORAIN STEEL COMPANY
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High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
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IMPROVED ANTI-KICK BIG-HEEL SWITCHES
HARD CENTER AND MANGANESE CONSTRUCTION

New York Switch & Crossing Co.
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RAMAPO AJAX CORPORATION

Ramapo Automatic Return Switch Stands for Passing Sidings

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RACOR Tee Rail Special Work.
Manganese Construction

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Metal Safety Railway Tie Co.
522 North American Bldg., Philadelphia, Pa.

All-metal cross ties
Types for open and closed tracks
"More flexible than wood"
See advertisement, issue, Sept. 29, page 86.
Ask for circular on either type. *Prices upon application.*

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Special Trackwork
For Street and Steam Railways

Steel Castings Gas Cylinders

ORIGINATORS OF
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is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

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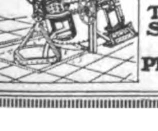
Electrical Machinery, Steam Turbines, Steam Engines, Condensers, Gas and Oil Engines, Air Compressors, Air Brakes



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Ten Standard Sizes 1/16 to 24 Tons Capacity
Most Rapid and efficient for making
Tool Steels, Alloy Steels, Forging Steels
Steel Castings, Malleable Iron, Grey Iron
Carbide, Ferro-Alloys etc.
PITTSBURGH ELECTRIC FURNACE CORPORATION
P.O. Box 1125. PITTSBURGH, PA.

BUCKEYE JACKS
high-grade R. R. Track and Car Jacks

The Buckeye Jack Mfg. Co.
Alliance, Ohio

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Type R-10

International Registers

Made in various types and sizes to meet the requirements of service on street and city system. Complete line of registers, counters and car fittings.

Exclusive selling agents for HEEREN ENAMEL BADGES.

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Fare Boxes *Change Carriers*

COIN
COUNTERS SORTERS WRAPPERS

THE CLEVELAND FARE BOX CO.
CLEVELAND, OHIO
Canadian Branch, Preston, Ontario.

FORD TRIBLOC

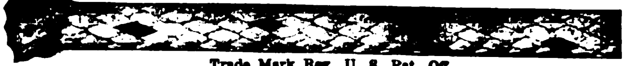
A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only block that carries a five-year guarantee.

FORD CHAIN BLOCK CO.
Second and Diamond Sts., Philadelphia

Heywood-Wakefield
CAR SEATS
of pressed Steel for all Classes of Passenger Service. Rattan for covering seats and for snow sweepers.
HEYWOOD-WAKEFIELD CO.
Factory at Wakefield, Mass.
Offices at New York, Chicago, San Francisco

For detailed description — see — CAR BUILDERS CYCLOPEDIA 1922 Edition

SAMSON SPOT WATERPROOFED TROLLEY CORD



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Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.
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HALE-KILBURN
CAR SEATS
For Every Class of Service
General Offices and Works: Philadelphia
Offices: New York, Chicago, St. Louis, Washington, San Francisco

OXYGEN
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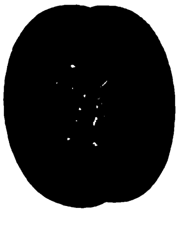
INTERNATIONAL OXYGEN COMPANY
NEWARK NEW YORK PITTSBURGH TOLEDO

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



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"HONEYCOMB" AND "ROUND JET" VENTILATORS
for Monitor and Arch Roof Cars, and all classes of buildings:
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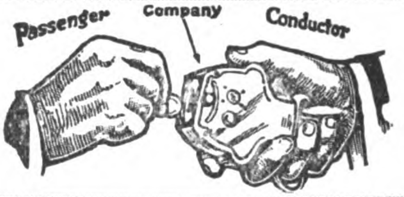
Full Revolving
No Outriggers
Motor Truck Mounting
Send for Bulletin No. 22

The Universal Crane Co., 0000 Swetland Bldg., Cleveland, O.



Direct Automatic Registration By the Passengers
Rooke Automatic Register Co.
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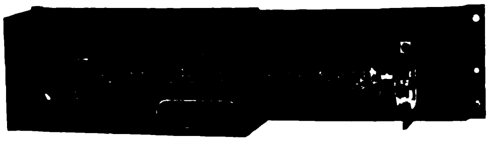
THE BEST TRUSS PLANK ELECTRIC HEATER EVER PRODUCED



No. 478E

GOLD CAR HEATING & LIGHTING CO., BROOKLYN, N. Y.

"OSKELITE"
The Stop Light for street cars. Operates from brake system. Details on request
The Oskel Equipment Co.
940 McCormick Bldg., Chicago, Ill.

Car Heating and Ventilation
are two of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.
The Peter Smith Heater Company
6209 Hamilton Ave., Detroit, Mich.

SEARCHLIGHT SECTION

POSITIONS VACANT

AUDITOR wanted. We want a young man, experienced and competent in electric railway accounting. Salary $250 per month. P-633, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

DRAFTSMEN-COMPUTERS wanted on railway trackwork working knowledge of and facility in trigonometry essential. State in letter, age, education, experience and approximate salary. Employment Dept., Bethlehem Steel Co., Steelton, Pa.

GRADUATE electrical engineer wanted to call on power companies, electric and steam roads. Prefer one with about one year's experience. Considerable travel. Headquarters Chicago. Advise schooling, experience and salary expected. P-635, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

TRAFFIC manager desired for traffic survey on interurban line in East Central Pennsylvania. State qualifications, experience and salary required. Schuylkill Railway Company, 2035 Washington Avenue, Philadelphia, Pa.

POSITIONS WANTED

MASTER mechanic, city or interurban railway, experienced on all branches. 14 years' experience. PW-619, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT of transportation and equipment, with eighteen years' experience, open for position of superintendent or manager, Jan. 1. PW-629, Electric Railway Journal, Real Estate Trust Bldg., Phila., Pa.

SUPERINTENDENT of transportation, at present with a large successful property that has been placed on a sound basis largely through efforts of advertiser, solicits correspondence or interviews with managers of city and suburban properties that require effort and ability to get results. A wide practical experience places me in a position to build up an efficient organization that would be a credit to any property. Also recognized as an economical operator, quick to locate leaks and correct same. High grade references from present employers as to character and ability to get results regardless of size or condition of property. Personal reasons for desiring a change. PW-604, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

YOUNG man, 23, desires position on street or interurban shop, a hustler and good worker; well recommended; 8 years' experience electrical and mechanical member A. E. R. A. and N. Y. R. Club. PW-631, Electric Railway Journal, 10th Ave. at 36th St., New York.

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RELAYING RAIL

30 Tons 5-in. 80 lb. A.S.C.E. Section Lengths 30-33-ft. Excellent condition.

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RAILS

Cars, Locomotives, Tanks, Steel Piling Fairbanks-Morse Standard Gage Gasoline Motor Car; Seats 34 people

ZELNICKER IN ST. LOUIS

400 Tons 65 lb. rails

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50—G. E. No. 80-A Motors.
50—Controllers, K-28-B; K-12.
35—B-2 Compressors.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

VACANT POSITION

Assistant Chief Electrical Engineer

Government Railways, Victoria (Australia)

Applications are invited for the position of Assistant Chief Electrical Engineer, Victorian Railways, at a salary of £1,000 per annum.

Applications must reach Melbourne before the 31st. March, 1924.

Applicants must pass medical examination, and must be capable of successfully handling all engineering and operating matters in connection with electrified railway systems, of preparing proposals, alterations and extensions, and of superintending the erection and maintenance of electric power and lighting installation throughout the railway.

Applicants must give: name, age, place of birth, details of engineering and administrative qualifications and practical experience of electrical railways.

Applicants must furnish certified copies of references.

Applications must be lodged in a sealed enveloped, marked "APPLICATION FOR POSITION OF ASSISTANT CHIEF ELECTRICAL ENGINEER," and must be forwarded to the Secretary, Victorian Railways, Melbourne, Australia, direct, to reach Melbourne on or before the 31st, March, 1924.

DONALD MACKINNON,
Commissioner of Australia, in the U. S. A.

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RELAYING RAILS

80 and 90 lb.

Full complement of Angle Bars. Shipment January and February, 1924.

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RAILWAY MOTORS

2—Unused General Electric, type 210-H, 50% of market price.

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Good Relaying Rails

Are as Serviceable as New Rails, with a Big Saving on the Price

We have ready for prompt shipment First-Class Relaying Rails in various weights. Get in touch with us, stating what weight rail and tonnage desired, and we will submit quotations.

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531 Peoples Gas Bldg., Chicago
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26-ton Baldwin Westinghouse, all steel, fully equipped, first-class condition, double and single-truck modern light-weight steel cars.

G. T. ABEL,
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WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

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Collier, Inc., Barron G.
Air Receivers & Aftercoolers
Ingersoll-Rand Co.
Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Armature Shop Tools
Elec. Service Supplies Co.
Automatic Return Switch Stands
Ramapo Ajax Corp.
Automatic Safety Switch Stands
Ramapo Ajax Corp.
Axle Straighteners
Columbia M. W. & M. I. Co.
Axles
Bemis Car Truck Co.
Brill Co., J. G., The
St. Louis Car Co.
Standard Steel Works Co.
Axles, Bus
Timken-Detroit Axle Co.
Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Westinghouse E. & M. Co.
Axles, Trailer, Motorbus and Passenger Car, Front and Rear
Timken-Detroit Axle Co.
Babbitt Metal
Ajax Metal Co.
Babbitting Devices
Columbia M. W. & M. I. Co.
Badges and Buttons
Elec. Service Supplies Co.
International Register Co., The
Barges, Steel
Amer. Bridge Co.
Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Brill Co., J. G., The
Columbia M. W. & M. I. Co.
General Electric Co.
Gilbert & Sons B. F. Co., A.
St. Louis Car Co.
Westinghouse E. & M. Co.
Bearings, Center and Boiler Side
Baldwin Locomotive Works
Stucki Co., A.
Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Heati'g Co.
Elec. Service Supplies Co.
St. Louis Car Co.
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Babcock & Wilcox Co.
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McGraw-Hill Book Co., Inc.
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Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.
Bonds, Rail
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse E. & M. Co.
Boxes, Switch
Johns-Pratt Co.
Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.
Brake Adjusters
Brill Co., The J. G.
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Westinghouse Tr. Br. Co.
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Amer. Br. Shoe & Fdy. Co.
Barbour-Stockwell Co.
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Brill Co., The J. G.
St. Louis Car Co.
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Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.
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Amer. Bridge Co.
Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse E. & M. Co.

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Anderson Mfg. Co., A. & J. M.
Brushes, Wire, Pneumatic
Ingersoll-Rand Co.
Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.
Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.
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Cambric Tapes, yellow and black varnished
Irvington Varnish & Ins. Co.
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Cars, Dump
Brill Co., J. G., The
Differential Steel Car Co.
St. Louis Car Co.
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Elec. Service Supplies Co.
Car Panel Safety Switches
Consolidated Car Heati'g Co.
Westinghouse E. & M. Co.
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Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.
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Brill Co., J. G., The
St. Louis Car Co.
Cars, Second Hand
Electric Equipment Co.
Transit Equipment Co.
Cars, Self-Propelled
Brill Co., J. G., The
General Electric Co.
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Columbia M. W. & M. I. Co.
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Standard Steel Works Co.
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St. Louis Car Co.
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Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.
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Cleveland Fare Box Co.
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General Electric Co.
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Elec. Ry. Improvement Co.
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General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Cleaners and Scrapers Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
St. Louis Car Co.
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General Electric Co.
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Coil Banding and Winding Machines
Elec. Service Supplies Co.
Coils Armature and Field
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General Electric Co.
Westinghouse E. & M. Co.
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Cleveland Fare Box Co.
Intern'l Register Co.
Johnson Fare Box Co.

Coin Sorting Machines
Cleveland Fare Box Co.
Coin Wrappers
Cleveland Fare Box Co.
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General Electric Co.
Westinghouse E. & M. Co.
Commutator Truing Devices
General Electric Co.
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General Electric Co.
Westinghouse E. & M. Co.
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Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.
Compressors, Air Portable
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Condensers
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General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
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Irvington Varnish & Ins. Co.
Connectors, Solderless
Westinghouse E. & M. Co.
Connectors, Trailer Car
Consolidated Car Heat. Co.
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Ohio Brass Co.
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General Electric Co.
Westinghouse E. & M. Co.
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Westinghouse E. & M. Co.
Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
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Anaconda Copper Mining Co.
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Internat'l Register Co., The
Roebling's Sons Co., John A.
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Cord Connectors and Couplers
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Samson Cordage Works
Wood Co., Chas. N.
Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
St Louis Car Co.
Westinghouse Tr. Br. Co.
Cranes
Allis-Chalmers Mfg. Co.
Universal Crane Co.
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Universal Crane Co.
Cranes, Motor Truck
Universal Crane Co.
Cranes, Portable
Universal Crane Co.
Cranes, Gasoline or Electric
Universal Crane Co.
Cross Arms (See Brackets)
Crossing Foundations
International Steel Tie Co.
Crossing, Frog & Switch
Ramapo Ajax Corp.
Wharton, Jr., & Co., Wm.
Crossing, Manganese
Ramapo Ajax Corp.
Crossings
Ramapo Ajax Corp.
Crossings, Track (See Track, Special Work)
Crossings, Trolley
Ohio Brass Co.
Cut Outs
Johns-Pratt Co.
Curains and Curtain Fixtures
Brill Co., The J. G.
Elec. Service Supplies Co.
Morton Mfg. Co.
St. Louis Car Co.
Dealer's Machinery
Elec. Equipment Co.
Toledo & Indiana R.R. Co.
Transit Equip. Co.
Zelnicker Supply Co., Walter A.
Derailing Devices (See also Track Work)
Derailing Switches
Ramapo Ajax Corp.
Destination Signs
Columbia M. W. & M. I. Co.
Elec. Service Supplies Co.

Detective Service
Wish-Service, P. Edward
Door Operating Devices
Brill Co., The J. G.
General Electric Co.
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St. Louis Car Co.
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Brill Co., The J. G.
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General Electric Co.
Nat'l Pneumatic Co., Inc.
Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.
Drills, Rock
Ingersoll-Rand Co.
Drills, Track
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Ohio Brass Co.
Dryers, Sand
Elec. Service Supplies Co.
Ears
Ohio Brass Co.
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Amer. Electrical Works
Amer. Steel & Wire Co.
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Western Electric Co.
Electric Furnaces
Amer. Bridge Co.
Electric Grinders
Railway Track-work Co.
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Railway Track-work Co.
Electrodes, Steel
Railway Track-work Co.
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Arnold Co., The
Beeler, John A.
Bibbins, J. Rowland
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Byllesby & Co., H. M.
Day & Zimmerman, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Ong, Joe R.
Parsons, Klapp, Brinkerhoff & Douglas
Richey, Albert S.
Sanderson & Porter
Sangster & Co., A.
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Stone & Webster
White Eng. Corp., The J. G.
Wortham, Edwin
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Cleveland Fare Box Co.
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Ohmer Fare Register Co.
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Consolidated Car Fender Co.
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St. Louis Car Co.
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Westinghouse E. & M. Co.
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Godwin Co., Inc., W. S.
Forgings
Brill Co., J. G., The
Carnegie Steel Co.
Standard Steel Works Co.
Frogs & Crossings, Tee Rail
Ramapo Ajax Corp.
Frogs, Track (See Track Work)
Frogs, Trolley
Ohio Brass Co.
Furnaces, Elec
Pittsburgh Elec. Furnace Corp.
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Fuses, Refillable
General Electric Co.
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Railway Track-work Co.
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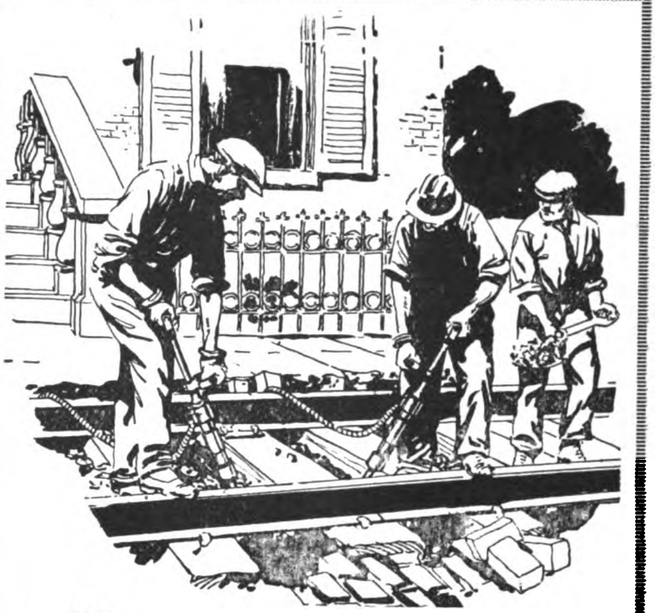

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Reduce track tamping and maintenance costs.

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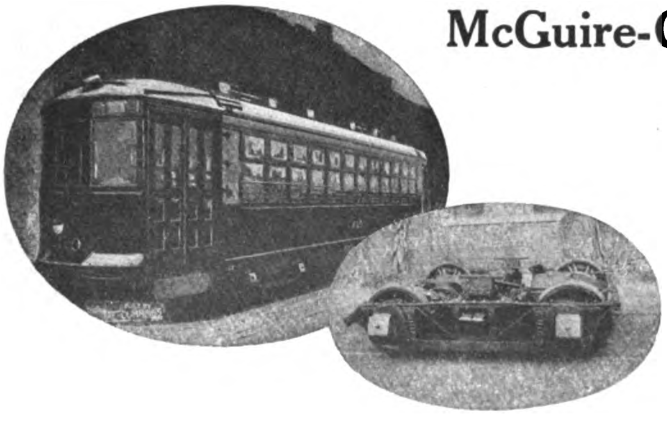

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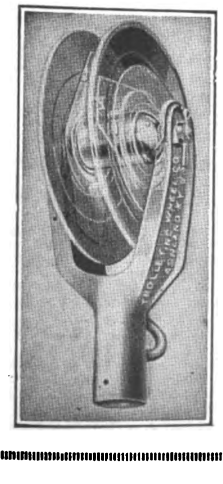

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Letters from users ring with praise of the Thornton. Reduce your repair bills and road delays by using this device. Ask for Bulletin.

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Incorporated
Ashland, Kentucky

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Lapp Insulator Co., Inc.

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(See Rail Joints)

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Brill Co., J. G.
St. Louis Car Co.

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Ohio Brass Co.

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Nichols-Lintern Co.

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Shaw, Henry M.
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Elec. Service Sup. Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

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Wharton Jr., & Co., Wm.

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General Electric Co.
McGuire-Cummings Mfg. Co
St. Louis Car Co.
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Texas Co., The
Universal Lubricating Co.

Lubricants, Oil and Grease
Galena Signal Co.
Texas Co., The
Universal Lubricating Co.

Manganese Steel Castings
Wharton, Jr., & Co., Wm.

Manganese Steel Guard Rails
Ramapo Ajax Corp.

Manganese Steel Switches Frogs & Crossings
Ramapo Ajax Corp.

Manganese Steel Special Track Work
Wharton, Jr., & Co., Wm.

Meters (See Instruments)

Meters, Car Watt-Hour
Economy Elec. Devices Co.

Molding, Metal
Allis-Chalmers Mfg. Co.

Motor Buses (See Buses, Motor)

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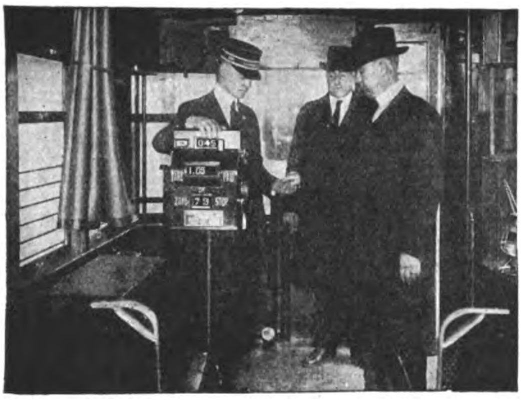

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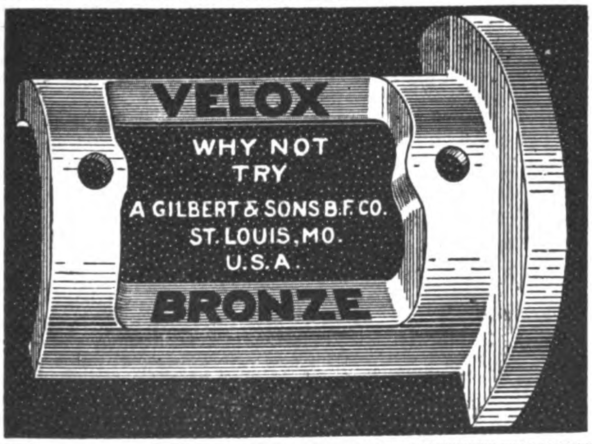

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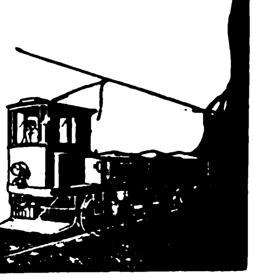

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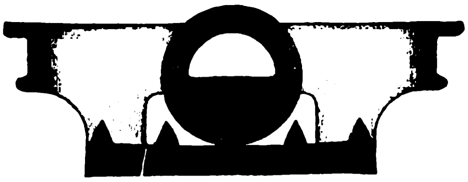

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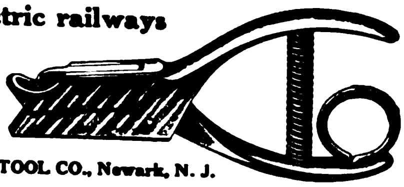

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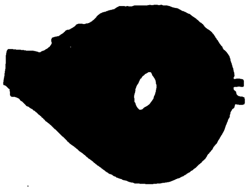

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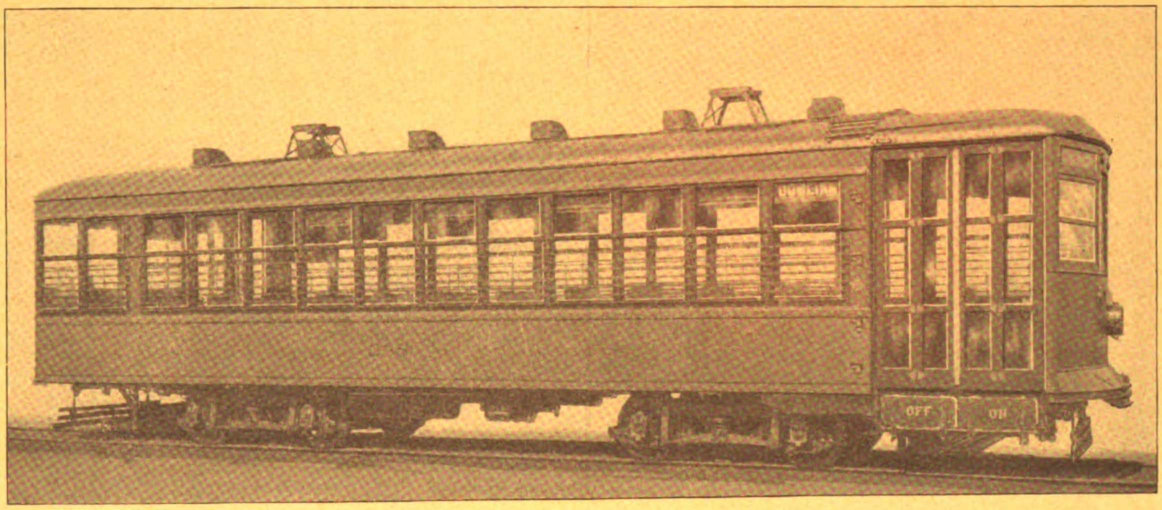

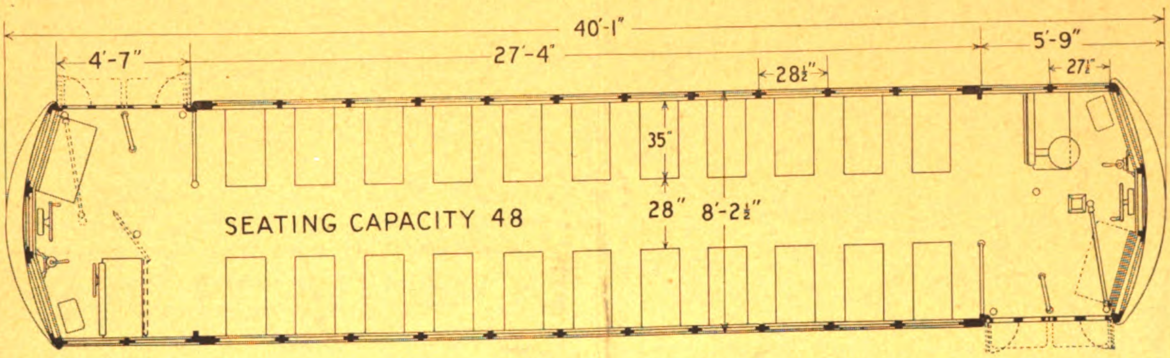

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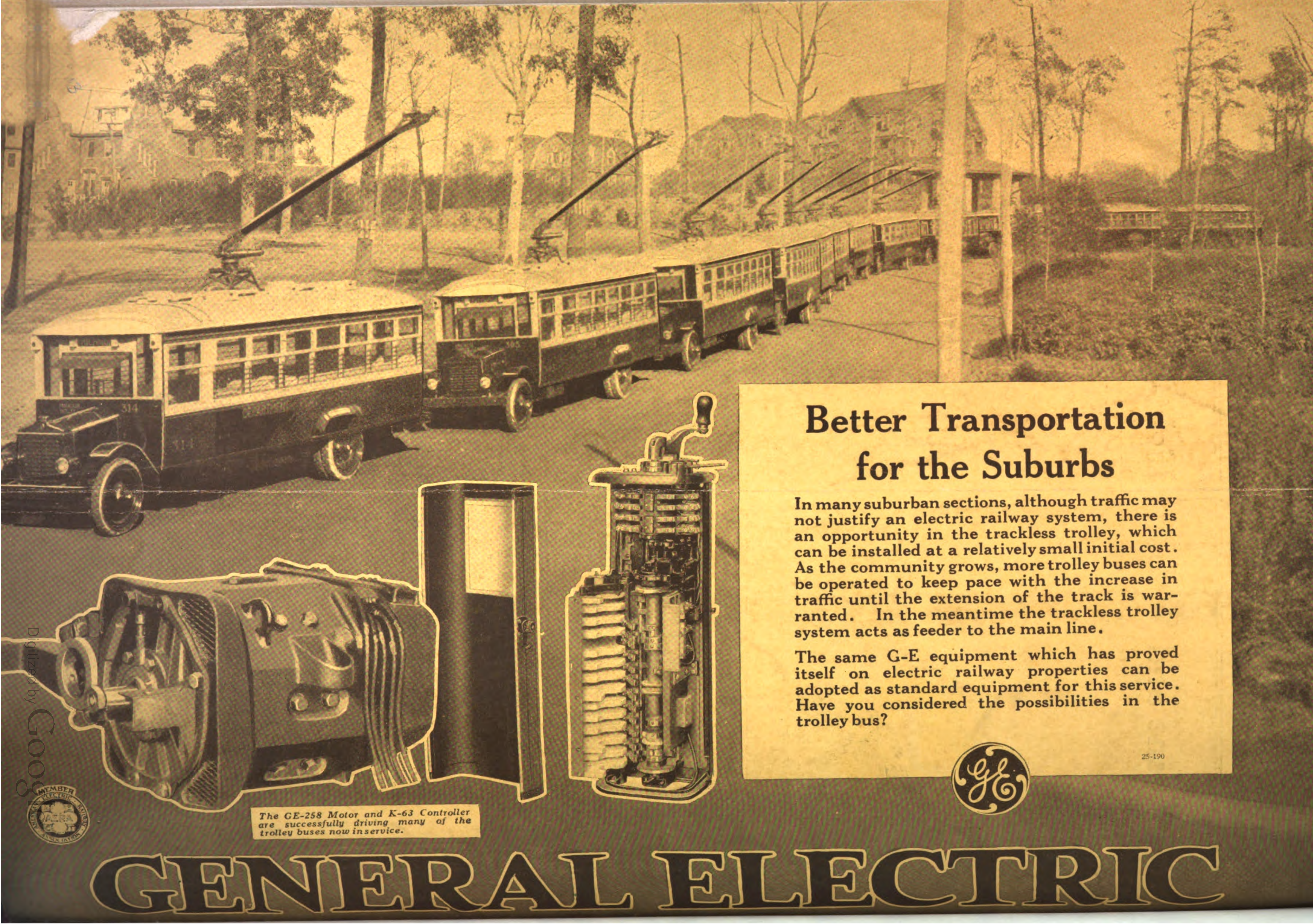

Better Transportation for the Suburbs

In many suburban sections, although traffic may not justify an electric railway system, there is an opportunity in the trackless trolley, which can be installed at a relatively small initial cost. As the community grows, more trolley buses can be operated to keep pace with the increase in traffic until the extension of the track is warranted. In the meantime the trackless trolley system acts as feeder to the main line.

The same G-E equipment which has proved itself on electric railway properties can be adopted as standard equipment for this service. Have you considered the possibilities in the trolley bus?

25-190

The GE-258 Motor and K-63 Controller are successfully driving many of the trolley buses now in service.

GENERAL ELECTRIC

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